THE TRANSPORTATION OF CANADIAN WHEAT TO THE SEA

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THE TRANSPORTATION OF CANADIAN WHEAT TO THE SEA

L. M. FAIR, M. A.

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PREFACE

The present essay on the TRANSPORTATION OF CANADIAN WHEAT TO THE SEA, prepared by Miss Louisa Fair, appears as the first of a series of monographs on the national problems of Canada published under the direction of the Department of Economics and political Science at McGill University. It is hardly necessary to say that these papers are written from a purely scientific and academic standpoint and without reference to partisan politics and particular interest. They are intended to serve within their measure and degree as a contribution towards a wider public knowledge of the essential features of the economic problems of the Dominion. It is felt that in the present critical era, the situation of our country, the great importance of our national finance and our national problems, render it advisable that everything possible should be done to stimulate public interest and to increase public knowledge in regard to our common concerns. It is fitting that a University, and especially a University department dealing with political economy, should endeavour to make some contribution towards this end.

The object of Miss Fair's monograph is to present the salient facts in regard to the wheat crop of Canada in its relation to national transportation. It will be observed that in connection with this discussion there emerge a number of conclusions of first rate importance. From the facts presented in the earlier chapters of the essay it is clear that for the present, and for a long time ahead, there is no prospect of a physical limitation to the continued expansion of the wheat crop and the wheat area of Canada. The opening of new land, the adoption of more intensive cultivation and the selection of new varieties of wheat can prolong it indefinitely. The old-time spectre of the exhaustion of the Northwest and the utilization of all the wheat land retreats, with increasing knowledge, further and further into the shadows of the future.

The central point of interest becomes, therefore, not the crop itself, but the methods of its handling and transportation. Miss Fair presents in brief résumé a description of the elevator system of the West and its relation to the farmer and to the transportation companies. It will be seen from this what a high degree of organization and efficiency has been introduced into the handling of the wheat crop.

Of equal importance, but with conclusions less gratifying

to Canadians, is the discussion in regard to the movement of grain to the Atlantic sea-board. It becomes apparent that in spite of all the money expended on the Canadian rail and water grain routes from the head of the lakes to Montreal, a large proportion of Canadian wheat — in some years the *larger percentage of the crop — is shipped* from American seaports and especially from the port of New York. The discussion upon this point is undoubtedly the most interesting and important part of the present monograph. It appears that there are factors in the situation favouring the port of New York which should not be apparent at first sight. In point of cheapness and convenience of transport the Canadian route from Fort William to Montreal has undoubted advantages. But there are indirect advantages in favour of New York very difficult to combat. The shipper at that port is able to rely upon the continual supply of irregular steamers (tramps) willing to take grain cargoes at high competitive rates. At times these rates are reduced almost to the vanishing point and their existence acts as a sort of magnet tending to draw the grain from our own route to the transit via Buffalo to New York.

If the facts and arguments here presented are sound they seem to have a very decided bearing on the prospects of the Hudson Bay route which is discussed in a later part of the essay. Apparently the Hudson Bay ports could at the best *be served only by regular scheduled steamers, and even these* relatively few. There could not be at Churchill or Nelson — or not for generations — anything like a "Shipping Market" that will bring the grain to that route. If the argument of this monograph is correct the decisive factor in the shipment of grain is found in the ocean facilities at the port of embarcation. The Hudson Bay route, under present conditions, would be sadly lacking in this respect.

Of almost equal interest is the discussion of the port of Vancouver. The figures presented show a very notable expansion in wheat shipment via the Panama Canal and might be thought at first sight to offer the prospect of an entire revolution in the Canadian grain trade. But Miss Fair shows, however, that the ultimate area that can ever be tributary to the Vancouver route is but a minor part of the Canadian grain fields. At the same time, even within the area indicated there is obviously the prospect of a trade great enough to enhance to a high degree the growth and wealth of Vancouver without perceptibly injuring the commercial interests of eastern Canada.

STEPHEN LEACOCK.

McGill University, May 1, 1925.

CHAPTER I

THE WHEAT CROP OF CANADA

The cultivation of the soil in Canada dates back to the earliest known times. When Jacques Cartier sailed up the St. Lawrence in 1535 he found that the Indians were already growing corn in cultivated patches around Hochelaga.

Not for many years after Cartier's visits did white men actually settle in what is actually Canada. In 1604 De Monts arrived from France and in the following year founded the first settlement of white men at Port Royal (Annapolis, N.S.). With the white man came the cultivation of wheat, a plant hitherto unknown on the North American continent. Lescarbot describes the feeling of intense excitement among the colonists when the first wheat, the growth of which meant so much to them, was planted.[1] "Wherein after M. de Poutrincourt had ordered a second tillage to be made a fortnight later, and the same, we sowed our French grains, both wheat and rye; and a week later he saw that his labour was not in vain, but gave him good hope by the production which the earth had already brought forth from the seeds which she had received.

From the Jesuit Relations we learn of the wheat harvests of the St. Lawrence Valley during the 17th century. Father Chas. L'Allemant wrote[2] (1616-1629): "The long duration of the snow might cause one to somewhat doubt whether wheat and rye would grow well in this country. But I have seen some as beautiful as that produced in your France and even that which we have planted here yields to it in nothing."

Experiments showed that wheat sown in the spring succeeded better than that sown before the winter.[3] In answer to an inquiry as to whether the land was capable of producing enough for its inhabitants, LeJeune mentions one Sieur Giffard who hoped to harvest enough wheat in 1636 to feed twenty persons.[4] Yet mention is made of provision ships coming from France in 1642.[5] As the nature of the soil and the climate were more widely understood these imports would seem to have been unnecessary. The Relation of 1652-53

[1] Lescarbot: Hist. of New France.
[2] Jesuit Relations, vol. 4, p. 193.
[3] Ibid., vol. 6, p. 29 and p. 77.
[4] Ibid., vol. 9.
[5] Ibid., vol. 22, p. 39.

records:[1] "The French grains yield excellent crops and in this respect we can do without aid from France however numerous we may be here. The more settlers there shall be, the greater plenty shall we enjoy."

During these early years agriculture suffered by attacks by the Indians. In their raids these savages attacked the settlers, destroyed their implements and cattle and burnt all the wheat and Indian corn that they could find.[2] In 1667-68 the Relation records[4] that, having made peace with the Iroquois, "Fear of the enemy no longer prevents our laborers from causing the forests to recede and from sowing their fields with all sorts of grain." The result of this more settled condition was that in 1692, 89,711 bushels of wheat were produced, followed in 1695 by a crop of 129,154 bushels and in 1698 by 160,978 bushels. The most flourishing period for New France began after the Treaty of Utrecht. Between 1713 and 1730 the population rose from 19,000 to 34,000 and agriculture progressed in proportion.[3] In the ten years from 1720 to 1730 the area of land under cultivation rose from 71,000 to 148,000 arpents. In 1719, 240,000 bushels of wheat were grown which increased to 738,000 bushels by 1734.[4] All this wheat was spring sown. Despite the primitive methods used the yield ran from 8 to 12 minots per arpent, or 9½ to 14 bushels per acre.[2] Experiments carried on with fall wheat by some of the better farmers had not been encouraging.

In the latter years of the French régime wheat was exported to France, the export amounting in one year (1754) to as much as 80,000 bushels.[5]

After the coming of the English and opening up of what is now Ontario by the United Empire Loyalists, the valleys of the Thames and the Richelieu were the most famous wheat fields. Lower Canada's maximum wheat crop was that of 1850, when 3,073,940 bushels were produced, a record which has never since been equalled.

Upper Canada began the export of wheat and of flour with its earliest settlement.

During the fifties, the Crimean War caused the price of wheat to rise so that its cultivation became more profitable to the Canadian farmer. The American Civil War in the Sixties had the same result.

In what is now Manitoba, the earliest attempts at cultivation of the soil were made by the settlers which were brought

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[1] Jesuit Relations, vol. 40, p. 215.
[2] Ibid., vol. 40, p. 109.
[3] Ibid., vol. 51, p. 167.
[4] A. D. DeCelles: Canada and its Provinces, vol. 15.
[5] Adam Shortt: Canada and its Provinces, vol. 2.

out to the Red River by Lord Selkirk. The first band of colonists arrived in 1812,[1] too late to plant a crop that season. Miles McDonell who was in charge of the little colony described their first attempts at agriculture in a letter to Lord Selkirk,[2] dated July 17th, 1813.

"Our crops from bad culture, and the seed being old do not promise returns, the winter wheat being late sown has totally failed; as also the summer wheat, pease and English Barley; of all these there must be fresh seed sent us. The appearance of the potatoes promises good returns. The Indian corn has almost totally failed; from a great drowth after planting, grubs, etc. The sowing was chiefly done with a hoe as well as the planting, only one imperfect plough was got agoing late in the season, there being no man here capable of making a good one."

The settlers persevered, however, and by 1822, 235 bushels of wheat were sown. The first satisfactory crop, that of 1824, yielded 44 bushels of wheat per acre from the plow and 68 bushels after the hoe.[1] By 1830 the colony was in a flourishing condition, but until 1878 when the first railway reached St. Boniface, it was forced to remain an isolated community. After the coming of the Canadian Pacific Railway the farmers were able to secure a market for their surplus grain and agriculture flourished apace.

In Saskatchewan and Alberta, the first farming was done around the Hudson's Bay Company posts at Carlton, Prince Albert and Battleford, etc., where the factors grew vegetables, oats, wheat, etc., for their own use. Owing to lack of transportation facilities the market was purely local. Not till after the Canadian Pacific Railway was built were these provinces settled or wheat cultivated to any extent.

At Confederation, 85 per cent of Canada's wheat crop was grown in Ontario. With the opening of the West and *the bringing under cultivation of the great wheat fields of the* prairies, Ontario's yield has become of less relative importance, as shown in the following tables:

Yield of Wheat

	1910 Bushels	1900 Bushels	1890 Bushels	1880 Bushels
Canada	132,077,547	55,572,368	42,223,372	32,350,269
British Columbia	*206,570*	*359,419*	*388,300*	*173,653*
Alberta	9,060,210	797,161	94,929	50,648
Saskatchewan	66,978,996	4,306,811	1,697,480	69,007
Manitoba	34,127,493	18,353,013	16,092,220	1,033,673
Ontario	19,843,626	28,418,907	21,314,582	27,406,091

[1] Life of Lord Selkirk: Rev. Geo. Bryce, D.D

[2] Red River Settlement Papers; selected by Chester Martin.

	1910 Bushels	1900 Bushels	1890 Bushels	1880 Bushels
Quebec	932,450	1,968,203	1,646,882	2,010,004
New Brunswick	204,125	381,699	209,809	521,956
Nova Scotia	223,530	248,476	165,806	529,251
Prince Edward Island	501,533	738,679	613,364	546,986

Acreage in Wheat [1]

	1910 acres	1900 acres	1890 acres
Canada	8,864,154	4,224,542	2,701,212
British Columbia	9,492	15,967	15,156
Alberta	879,756	43,062	5,071
Saskatchewan	4,228,222	487,212	108,737
Manitoba	2,759,445	1,965,200	896,622
Ontario	870,354	1,487,633	1,430,532
Quebec	62,882	139,826	168,929
New Brunswick	13,424	26,996	17,306
Nova Scotia	12,198	16,334	14,157
Prince Edward Island	28,741	42,318	44,703

Percentage distribution of Wheat in the Census years 1870-1910 and in 1917 [2]

Year	N.B. & N. S.	Que.	Ont.	Man.	Sask.	Alta.	Other Provinces	Total
1870	2.5	12.4	85.1	—	—	—	—	100%
1880	4.0	6.2	84.7	3.2	—	—	1.0	100%
1890	—	3.9	50.5	38.1	4.0	—	3.5	100%
1900	—	5.5	51.5	33.0	7.8	—	4.2	100%
1910	—	—	15.0	25.8	50.7	6.9	1.6	100%
1917	0.5	1.8	5.2	16.4	56.0	20.0	0.1	100%

The bulk of Canada's wheat is now grown in the three Prairie Provinces; Saskatchewan alone grew 62½ per cent of the total crop of 1922.[3]

Yield per Province for the Year 1922

	Bushels	Percentage
Manitoba	60,051,000	15 %
Saskatchewan	250,167,000	62½ %
Alberta	64,976,000	16½ %
British Columbia	1,035,000	
Ontario	19,893,000	5 %
Quebec	2,286,000	0.6 %
Nova Scotia	293,000	
Prince Edward Island	688,800	
New Brunswick	396,000	
Total for Canada	399,786,800	

Manitoba, Alberta and Saskatchewan together raised 90 per cent of the crop of 1922.

The final estimates of the Dominion Bureau of Statistics

[1] Dominion Census, 1911.
[2] Canadian Census, 1921.
[3] Dominion Bureau of Statistics.

placed Canada's 1923 wheat crop at 474,199,000 bushels, the highest yield ever recorded in Canada. The yield per acre was 21 bushels. The three prairie provinces produced 452,260,000 bushels of wheat or 95½ per cent of the total crop. Manitoba grew 32,804,000 bushels of wheat; Saskatchewan, 252,622,000[1] bushels, and Alberta, 166,834,000 bushels.

Areas of Field Crops in Canada[2]

	1921, acres	1920, acres	1910, acres	1900, acres
Total grains	39,203,961	36,609,661	20,980,611	12,296,690
Wheat all	20,276,076	17,835,734	8,864,514	4,224,542

The following table shows the acreage yield per acre, *total yield and total value of Canada's wheat crop during the* past twelve years. It will be noticed that while the acreage increased steadily the total crop varies considerably from year to year according to the season. In 1915, for example, the bumper crop of 376,303,600 bushels was produced on 12,986,400 acres, but in 1919 a crop only about half that size was taken from 19,125,968 acres. The yield per acre also varies; the record of 28.93 bushels per acre in 1915 is still unbroken and likely to remain so for some time.

Wheat Yield Canada — 1911-1922

	Acres	Yield per acre	Total Yield	Total Value
1911	11,100,672	20.80	230,924,000	$148,123,000
1912	10,996,700	20.38	224,159,000	$139,090,000
1913	11,015,000	21.04	231,717,000	$156,462,000
1914	10,293,900	15.67	161,280,000	$196,418,000
1915	12,986,400	28.93	376,303,600	$312,569,000
1916	15,369,709	17.10	262,781,000	$344,096,400
1917	14,755,850	15.75	233,742,850	$433,038,600
1918	17,353,902	11.00	189,075,350	$381,677,700
1919	19,125,968	10.00	193,260,400	$457,722,000
1920	18,232,374	14.50	263,183,300	$427,357,300
1921	23,261,224	13.00	300,858,100	$242,936,000
1922	22,422,693	17.75	399,786,400	$399,419,000

The Canada Year Book of 1918 publishes a table comparing Canada's average yield per acre with the average yield of other wheat producing countries of the world. The calculations were made over the *ten year period from 1907 to 1916*,[3] except in the case of Canada when the years 1908 to 1917 were used.

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[1] Dominion Bureau of Statistics.

[2] Canadian Year Book, 1918.

[3] Statistics of grain production nowhere follow the calendar year. In Canada the crop year runs from September 1st to August 31st.

Average Yield per Acre of Wheat in the Great Grain Producing Countries of the World (1907-1916)

	Bushels per acre
United Kingdom	31.82
Canada	19.25
Australia	11.00
New Zealand	29.29
India	11.45
United States	14.72
Argentine	9.52

The bumper crop of 1922 gave Canada the second place among the wheat producing countries of the world, as shown by the following statistics supplied by the International Institute of Agriculture.

Relative Position of Canada in Production of Wheat:

	Bushels, 1922
United States	862,000,000
Canada	399,786,000
India	367,135,000
France	243,317,000
Argentine	189,047,000
Italy	161,643,000
Spain	125,470,000
Australia	107,263,000

The same authorities calculate the world's wheat production in 1922 at 3,103,278,000 bushels, Canada's share was a little more than one-eighth of this total. The year 1923, with an even larger crop of 470 million bushels, assures Canada's position as a wheat producing country.

Within the British Empire, the average production of wheat before the war, during the years 1909-1913 was as follows: [1]

Pre-War Average — 1909-1913

	Bushels
United Kingdom	59,640,000
Canada	197,118,000
India	359,035,000
South Africa	6,520,000
Australia	90,500,000
New Zealand	7,070,000
Total	719,883,000

[1] International Institute of Agriculture.

Canada then held second place, but since then the Canadian crop has exceeded the Indian, and Canada has earned the title of "Granary of the Empire." The figures for the past three seasons are given below:

Production of Wheat in the British Empire [1]

	1923 bushels	1922 bushels	1921 bushels
United Kingdom	61,000,000	65,249,000	73,795,000
Canada	470,328,004	399,786,000	300,858,000
India	369,263,000	367,135,000	250,356,000
South Africa	*	6,696,000	8,689,000
Australia	*	107,263,000	132,285,000
New Zealand	*	8,500,000	10,565,000
Total		954,629,000	776,548,000

Exports of Canadian wheat and flour since Confederation show the wonderful development of this section of Canada's foreign trade.

Exports of Canadian Wheat and Flour [1]

Wheat:

	Bushels
1868	2,284,702
1871	1,748,977
1881	2,523,673
1891	2,108,216
1901	9,739,758
1911	45,802,115
1918	150,392,039

Wheat flour:

	Barrels
1871	306,339
1881	439,728
1891	296,784
1901	1,118,700
1911	3,049,046
1918	9,931,108

Her position as a producer of wheat has somewhat obscured the fact, even more significant, that Canada is now the largest single exporter of wheat in the world, having more surplus wheat for export than any other wheat growing

* Harvest to take place in December — January.
[1] Canadian Year Book, 1918.

country. For the International Grain Year ending August 1st 1923 [2] the International Institute of Agriculture gives the following figures:

	Bushels of wheat and flour reduced to wheat
Canada	279,000,000
United States	199,000,000
Australia	50,000,000
Argentine	140,000,000
India	28,000,000

Thus out of a total of 696,000,000 bushels exported by the leading countries, Canada exported two-fifths. For the next crop year ending August 1924, Canada's contribution will likely be even greater.

The destination of Canadian wheat exported for the past three Canadian Crop years (September 1st to August 31st) is given by the Dominion Bureau of Statistics in the following table:

Exports of Canadian Wheat

	1921 bushels	1922 bushels	1923 bushels
United Kingdom	29,294,612	92,498,351	166,846,960
United States	42,324,894	16,592,797	14,213,629
Belgium	14,069,843	4,069,245	5,348,388
France	5,051,461	1,111,752	3,188,274
Germany	1,832,739	1,219,257	1,185,984
Greece	4,667,639	3,794,535	4,055,703
Italy	21,048,458	10,298,424	8,197,537
Japan	.....	2,425,915	2,610,012
Netherlands	6,976,125	2,585,885	4,448,610
Sweden	673,443	360,396	889,716
Other Countries	3,275,943	1,532,681	2,094,755

[2] See note p. 9.

CHAPTER II

CANADA'S POTENTIAL WHEAT CROP

The continued production of wheat is a matter of the utmost importance to the future of Canada. At present a large amount of capital is invested in wheat lands, elevators, railways, steamships, etc. Any permanent shrinkage in the volume of the crop would be most disastrous to these interests. The Government is yearly giving great attention to the wheat plant and the potentialities of the Canadian wheat fields.

The origin of the wheat plant is lost in antiquity. Authorities differ as to whether it sprang from one or more original species. Mr. John Percival, Prof. of Agricultural Botany, University College, Reading, concludes that it originated from two or three wild species which through hybridisation, mutation, and the effects of selection and cultivation give the almost endless varieties of forms now existent.

The cultivation of wheat was known in prehistoric times, remains of the plant having been found among the Lake dwellings of Switzerland and with the mummies of Egypt.[1] It was also grown in Greece and Persia,[2] and in China.[3]

The Romans introduced it into Great Britain. Through the Middle Ages, rye was the staple food in Western Europe and Britain, but with the rising standard of living, wheat took its place until today the wheat crop is the largest cereal crop of the world.

Botanically, the wheat plant belongs to the Hordeae tribe of the Graminiea or Grass family. There are four principal kinds or sub-races:

1. Common wheat (*triticum sativum vulgare.*)
2. Egyptian and English wheat (*triticum sativum turgidum.*)
3. Flint wheat (*triticum sativum durum*) to which the macaroni varieties belong.
4. A dwarf variety (*triticum sativum compactum*) supposed to have been the kind produced in ancient times.

Each sub-race is in turn divided into many varieties. The wheat most commonly grown[4] belongs to *triticum sativum*

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[1] Encyclopedia Americana. Art. Wheat.
[2] "The Wheat Plant," John Percival.
[3] Harmsworth's Encyclopedia: Wheat.
[4] In the United States, Canada, Australia, England, France, etc. See "The Wheat Plant," John Percival, p. 433 and following.

vulgare, although in some localities[1] varieties of *durum* and spelt are extensively grown.[2]

Like all grasses, wheat first appears above the ground as a single blade and is therefore monocotyledonous and endogenous in its development. The inflorescence or ear is a true grass spike, consisting of spikelets arranged upon a rachis. At the base of each spikelet are two boatlike glumes, within which are from two to eight florets which when fertile contain one grain or berry each. The grains of different kinds of wheat vary considerably in size, form, and colour, but they all resemble each other in fundamental structure, being fruits with thin-walled pericarps, each containing a single seed, which consists of four parts:

1) The seed coat or testa;
2) The embryo or young plant;
3) The nucellar layer;
4) The endosperm or floury part, which is a thin walled parenchymatous tissue, stored with food for the nutrition of the embryo when germination commences. The endosperm-parenchyma forms 87 to 89 per cent of the total weight of the grain, and contains the starch and gluten.[3]

Ordinary white flour consists chiefly of the finely ground endosperm; the so-called milling offals consisting of the broken pieces of the pericarp or shell of the grain, the seed coat, aleuron layer and embryo.

Whether the wheat is "hard" or "soft" depends on the amount and character of the gluten in the grain, which is largely determined by the soil and climate. A short, forcing, growing season and a fertile soil tend to produce glutinous (hard) wheat, while the opposite conditions produce starchy (soft) wheat.[4] Hard wheats usually contain over 12 per cent gluten, of which 45 to 65 per cent is in the form of gliadin, an alcohol soluble protein. Soft wheats contain less gluten, but gluten of a higher gliadin content.[5]

When grown under the same conditions different varieties of wheat remain fairly constant, but when the conditions are changed the wheat grain loses its original characteristics; as, for example, when hard wheat is sown in a district where the soil and climate have hitherto produced only starchy wheats, it changes its character and in a few seasons develops a starchy grain also.[6]

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1 Spain and Portugal, Russia and India.
2 Encyclopedia Americana: Wheat.
3 Percival, op. cit.
4 Encyclopedia Americana: Wheat.
5 Ibid.
6 Ibid.

Wheat differs in composition from all other cereals in that the gluten which it contains is composed of the two proteins gliadin and glutenin. This gives wheat flour its distinctive bread-making value, for no other cereal contains a gluten that is capable of expanding and forming such a light porous loaf.[1]

While it is possible to cultivate wheat on a variety of soils, the best crop is attained on rich alluvium and soils formed from different kinds of rock thoroughly disintegrated and mixed with vegetable mold. Good wheat soils are rich in humus, that is, in decaying vegetable matter; this, through decay, supplies nitrogen, one of the principal elements used by the wheat plant in the formation of gluten. There has been a tendency, especially in newly opened wheat lands in North America, to grow wheat exclusively for a succession of years. This naturally results in a reduced yield and inferior crop, due to the loss of nitrogen from the land. Wheat does not remove a large amount of gross fertility from the soil, but exclusive wheat cultivation on virgin soil causes a rapid decay of the humus, and consequent loss of nitrogen. Wheat grown in a good rotation of crops, on land which is fertilized, does not exhaust the soil.[2]

The cultivation of wheat is simple and its adaptability to various soils and climatic conditions is superor to that of any other plant, so that today it is grown all over the world, from the Equator to beyond the Arctic Circle,[3] the only places where it is not cultivated being the low-lying regions of the Tropics.

The wheat crop is harvested in one country or another all the year round, as shown in the following table:[2]

January,	Australia, New Zealand, Argentina, Chili.
February,	India.
March,	India, Upper Egypt.
April,	India, Persia, Asia Minor, Lower Egypt, Mexico, Cuba.
May,	Japan, China, Central Asia, Morocco, Algeria, Tunis, Texas.
June,	South France, Spain, Italy, Greece, Turkey, Japan, United States, south of 40°.
July,	France, Germany, Austria, Hungary, Roumania, Bulgaria, South Russia, Northern United States.
August,	England, Northern France, Belgium, Holland, Central Russia, Canada, United States.

[1] Encyclopedia Americana: Wheat.
[2] Ibid.
[3] Percival: op. cit.

September, Scotland, Sweden, Norway, Canada.
October, Northern Russia, Finland.
November, South Africa, Argentina, Peru.
December, Burma, Australia, Argentina.

The great wheat fields of the world lie in the temperate regions between the parallels of 30°-60° N. and 27°-40° S. In Europe wheat is ripened as far north as 69° 28 N. on the Lyngenfjord in West Norway, and in European Russia it is cultivated around Archangel in latitude 64° 33 N. Spring wheats mature in Alaska up to 60° N., and in Canada ripe grain has been produced up to 65° N. on the Mackenzie River.[1] Wheat also has a wide altitudinal range; in Mexico, Colombia, Equador, and Abyssinia, cultivation is carried on at 8,000 to 10,000 feet elevation.[1]

The countries producing the greatest amounts of the best wheats are those which have a cold winter and a comparatively hot summer. For the most satisfactory growth and development of the grain, a cool moist growing season followed by a bright, dry and warm ripening period of six to eight weeks with a mean temperature of 66° F. is necessary. An annual rainfall of 20 to 30 inches is sufficient if the greater part of it falls during the growing season.

In Canada, the wheat fields lie between the Manitoba Lakes and the Rocky Mountains. The southern limit is the Canadian and United States boundary line along latitude 49°. The northern limit to Canadian wheat culture has been found to be most irregular. The isothermal line[2] which indicates a mean summer temperature (June, July, and August) of 57.5° F. touches the Rocky Mountains at about 52° latitude. The line is then drawn northward in a curve to the West and North of the Peace River until it touches latitude 59°. It then continues gradually south-east until it reaches the lower end of James Bay. This shows that in the Peace River district, wheat may be grown many miles North of its Northern limit in Saskatchewan or Alberta. The potential crop of a district seems to depend more on climate than on the latitude.

Three different types of wheat are grown in Canada. The hard red spring wheat grown on the prairies is noted for its "strength" when manufactured into flour. Durum is used to make macaroni. The third type is the soft red and white winter wheats grown in the eastern provinces.

The results of the investigations carried on (1923-24) by the United States Tariff Commission, into the relative costs

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1 Percival, op. cit.
2 Meteorological Service: Map of Canada.

of producing wheat in the United States and in Canada, appear to indicate, from the tabulated results of the number of bushels raised per acre, a superior fertility in the Canadian wheat lands.[1]

A 20-year Comparison in Yields Per Acre between Prairie Provinces and Principal Wheat Producing States of the Union.[2]

	Manitoba	Saskatchewan	Alberta	North Dakota	South Dakota	Minnesota	Kansas
1904	16.5	17.5	16.6	11.8	9.0	12.8	12.4
1905	21.1	23.0	21.5	14.0	13.7	13.3	13.9
1906	19.5	21.4	23.1	13.0	13.4	10.9	15.1
1907	14.2	13.5	18.3	10.0	11.2	13.0	11.0
1908	17.3	13.6	18.8	11.6	12.8	12.8	12.6
1909	17.3	22.1	19.0	13.7	14.1	16.8	14.4
1910	13.5	15.5	12.7	5.0	12.8	16.0	14.0
1911	18.3	18.5	20.8	8.0	8.0	10.1	10.7
1912	10.7	19.9	18.2	18.0	18.0	15.5	15.5
1913	20.0	19.5	10.5	10.5	10.5	16.2	13.0
1914	15.5	12.4	11.2	11.2	11.2	10.6	20.5
1915	26.4	25.0	18.2	18.2	17.1	17.0	12.5
1916	11.0	16.3	5.5	5.5	6.8	7.6	12.0
1917	14.9	14.3	8.0	8.0	14.0	17.5	12.2
1918	16.5	10.0	13.6	13.6	19.0	18.0	14.1
1919	14.3	8.5	6.8	6.8	8.0	9.4	13.8
1920	14.0	11.2	9.1	9.1	9.0	9.8	15.4
1921	11.5	14.9	8.5	8.5	9.0	9.7	12.2
1922	19.3	20.2	14.1	14.1	13.2	13.9	12.6
1923	12.0	21.0	8.0	8.0	9.0	12.0	13.0
Average for 20 years	16.7	16.9	18.4	10.9	11.4	13.1	13.5

In 1923 the Canadian farmer was thus able, according to the figures of the Commission, to produce a bushel of wheat for 46 cents less than the American. It was shown that on an eleven year average, the production cost per bushel of wheat in the United States was $1.58 as against $1.22 in Canada, and that in 1923 while it cost the United States farmer $1.49 to produce a bushel of wheat, the Canadian farmer was able to produce the same bushel for $1.03.

Ever since the Canadian West was opened various estimates have been put forward as to how much wheat Canada will ultimately produce. Any such calculation is much in the nature of a guess, as so many factors must be taken into account. James Mavor, Professor of Political Economy in the University of Toronto, in his report to the British Board of

[1] Agricultural and Industrial Progress in Canada, January, 1924.
[2] From the Canadian Pacific Railway.

Trade in 1904, gives several estimates worked out by different people. Estimate I, "drawn up by two gentlemen jointly,"[1] places the ultimate annual yield of wheat on the Canadian prairies at 254,375,000 bushels, which would give 169,250,000 bushels of wheat available for export. Estimate No. II "by a gentleman of equal authority and experience"[2] gave the total possible yield from the prairies as 357,455,000 bushels of wheat.

These estimates need no further comment when it is remembered that in the year 1923 a crop of 474,199,000 bushels of wheat was produced of which 432,260,000 bushels was grown by the Prairie Provinces.

Mr. Hugh McKellar, then Deputy Minister of Agriculture for Manitoba, made an estimate in 1902[3] of what the wheat production of the prairies might be ten years later. His calculations showed a crop of 350,000,000 bushels for 1912. These figures were not equalled by actual production until the year 1916, when 344,096,400 bushels of wheat were grown in the whole of Canada.

In 1904, Dr. William Saunders, then Director of experimental farms, made an estimate[4] which has not yet been equalled by any Canadian wheat crop. Estimating the area in the prairie provinces suitable for cultivation at 171,000,000 acres, and supposing that one quarter of this were under crop with wheat annually, the total crop, he thought, would be 812,000,000 million bushels of wheat.

In later years, the estimates of possible wheat production grow larger.

Mr. C. P. McLennan of London, England,[5] in 1922 estimated that only 15 per cent of Canada's available wheat area was at that time under crop. The acreage under cultivation is increasing rapidly year by year and he considered that in about thirty years 75 per cent of the wheat lands will be cultivated. This would increase Canada's production of wheat to the enormous quantity of 2,000,000,000 bushels annually.

The future production of wheat in Canada depends not only upon the physical conditions in that country, but also upon the demand for Canadian wheat in the world market. Production in Europe has been slowly "coming back" to prewar conditions. Before the war Russia exported 20% of the world's wheat crop; since the war these exports have been

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1 Mavor's Report, pp. 70 and 71.
2 Ibid., p. 73.
3 Ibid., p. 77.
4 Ibid., p. 74.
5 Agricultural and Industrial Progress, September, 1923.

reduced to almost nothing. Strenuous efforts are being made in Russia to increase the production and improve the strength of their wheat.[1] When this is accomplished Canadian wheat will have a strong competitor on the British market. The Argentine wheat, known as Rosafe, also compares favourably with Manitoba hard wheat.[2] The wheats of Australia are good, but lack the uniformity of strength which is so important to the miller.

Canada's present position as an exporter of wheat is assured so long as it retains the high standards of grading. The consuming nations must be able to rely implicitly on the Canadian Certificate Final.

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[1] Report of the Royal Grain Inquiry Commission.
[2] Ibid.

CHAPTER III

COLLECTION, STORAGE AND HANDLING OF THE CROP

The Canadian wheat crop is harvested usually between August 10th and September 10th, but, of course, the date varies according to the season and the locality. The wheat is ready to be threshed within ten days from the time it is cut, if the weather conditions are favourable, and then the problem of transportation begins. The first stage is to get the grain to the nearest country elevator, for few farmers have storage facilities. The farmer usually hands his wheat to the elevator in wagon loads averaging 60 bushels each. At the nearest railway station the most conspicuous objects in the town or village are the grain elevators, which are usually lined up in a row along the railroad tracks. Competition between the elevators in each town continues to be very keen as long as there is any space vacant.

The wheat brought in by the farmer is examined by the elevator agent and a mutual understanding is arrived at between him and the farmer as to the grade of the wheat. The agent is advised daily from his head office at Winnipeg of the prevailing prices for each grade of wheat. The price agreed on at the country elevator is based on the value of the wheat in store at Fort William, minus freight and handling charges. The wagonload is then dumped into the pit at the elevator and weighed in the presence of the owner, and in exchange the farmer receives from the agent what is called a cash ticket, on which is given the farmer's name, the gross quantity of wheat, the grade and dockage, and the aggregate value of the load. The cash ticket is indeed a cheque. For example, if the net load were 60 bushels and the price $1.00 per bushel for that grade, the farmer would receive a ticket for $60.00.

In case the farmer is dissatisfied with the grading of his wheat or the price offered for it by the elevator, he can, according to the Canada Grain Act,[1] demand that the elevator company store his grain. If the trouble is about the grade only, a sample is agreed upon by the agent and farmer and sent sealed to the Chief Grain Inspector at Winnipeg, whose decision as to the grade is final. In the interval, the

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1 2 Geo. V., c. 27.

wheat is kept separate by the elevator agent, and the farmer, instead of getting a cash ticket, receives a storage ticket, showing the gross amount of grain which he has stored at the elevator. The storage ticket is exchanged for the cash ticket when the Chief Inspector's decision as to the grade of the wheat is received at the elevator.

Another method, also widely used by the farmers, is to arrange with an elevator company for space for a carload (usually from 12,000 to 14,000 bushels) for the shipment of wheat of a certain grade. A storage ticket is given to the farmer for each load he brings in until he has a carload at the elevator. Meanwhile, arrangements are made with the railway station agent for a car to be ready, and as soon as the car is supplied and a carload of wheat is ready at the elevator, the shipment to Fort William is made. When the car is loaded, the farmer surrenders his storage tickets, and, on payment of the elevator fees of 1¾ cents per bushel, receives the bill of lading. The bank will advance about 60 per cent of the market value of the bill of lading in cash; or a similar advance may be obtained directly from the elevator company.

A farmer may, if a siding runs near his land, load his car directly, without going through an elevator.

As space in an elevator is filled with grain, the agent wires for cars to be sent by the railway company to his station. The cars used for the carriage of the wheat are ordinary box cars with the lower part of their doors closed. Grain is poured into them through the opening by a chute on the side of the elevator. When cars enough to form a train are filled, the wheat is forwarded to Fort William. All cars must pass through Winnipeg, when a sample of wheat is taken from each car and examined by Dominion Government inspectors. Their decision as to grade is final.

The handling of great quantities of grain, such as the United States and Canada harvest every year, is made possible by means of grain elevators which are equipped with adjustable machinery for unloading, loading, and storing grain and for cleaning, drying and weighing it.

The first grain elevator in Canada was built in 1883 by the Canadian Pacific Railway at Port Arthur, where it is still in use.[1] There are now about 4,500 country elevators in the three great grain-producing provinces, Manitoba, Saskatchewan and Alberta, located at between 1,600 and 1,700 points.[2] Some 300 companies and individuals are financially

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[1] Information kindly supplied by the Canadian Pacific Railway.
[2] James Stewart, in "The Annals."

interested, to the extent of at least $50,000,000, in providing country elevator facilities. There are also about 1,921[1] loading platforms owned by the railways capable of accommodating about 5,000 cars. A loading platform is a wooden structure on a siding onto which a farmer can drive his team and from which he can shovel the grain into a railway car.

There are six different kinds of elevators defined in the Canada Grain Act:[2].

1) "Country elevators," situated at railway stations and receiving grain for storage before inspection.

2) "Public elevators," which receive grain for storage from the western inspection division after inspection.

3) "Eastern elevators," for the storage, after inspection, of eastern grown grain.

4) "Terminal elevators," which receive or ship grain at points declared to be terminal.

5) "Private terminal or hospital elevators," used for cleaning or other special treatment of rejected or damaged grain; under regulations governing sample markets all grain received into such elevators must be their own property, though the owner or owners of grain may contract for the handling or mixing of grain in such elevators.

6) "Manufacturing elevators," used or operated as part of any plant engaged in the manufacture of grain products in the western inspection division.

A small, or country elevator consists of a building or "house" with a small structure or cupola above it.[3] The house contains a series of deep bins in which grain of different grades is stored. In the cupola is the machinery for operating the elevator leg, the turnhead spouts and the garners; also the weighing and cleaning machines.

There are two types of grain elevating machinery. In the first, the grain is carried up by buckets attached to an endless chain travelling in the leg of the elevator. The leg is divided in two, the buckets going up in one chamber and coming down empty in the other. The whole leg can be raised so as to pass over the side of a ship and lowered to reach the bottom of the hold. When the leg is adjusted, the grain is scooped up in the buckets and emptied into a receiving chamber. In the hold of the ship are men armed with large electric shovels, who guide the grain to the leg so that the scoops can reach it. In the receiving room the grain is taken by another belt and carried to the top of the elevator

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[1] Canadian Year Book, 1922.
[2] 2 George V., c. 27.
[3] Encyclopedia Americana: Grain Elevators.

to the garner. From the garner, the grain is allowed to fall through a spout into the weighing apparatus, whence, by machinery, it is conducted, if necessary, to the cleaner, and finally to the proper storage bin.

In the penumatic type of elevator, the leg is replaced by a suction tube hanging from the end of a hollow crane-like boom which can be swung over the car or vessel to be unloaded. The tube is flexible and telescopic, so that it may reach all parts of a ship's hold. By means of a powerful vacuum pump the grain is sucked up from the hold to a vacuum chamber and from there it is directed to the scales, cleaners, and bins.

When railway cars are to be unloaded, they are run alongside the elevator, so that the elevator leg is immediately above the car. The leg is lowered and men in the car shovel the grain to the scoops by which it is carried upward.

To carry grain from a ship to railway cars the elevator leg is lowered into the hold, conveyors carry the grain up to the turnhead spouts, from which it passes down to the storage bins and thence through the floor valves of the bins to the cars placed underneath them. An elevator can deliver a carload of 1,200 bushels in about three minutes.

All grain grown in Canada and shipped in carload lots or cargoes from elevators is subject to inspection and grading by the Dominion Government. As each car arrives at an inspection point, it is sampled and graded by qualified samplers and inspectors appointed under the Canada Grain Act.[1] On arrival at a terminal elevator, the grain is weighed, cleaned and then binned, according to the grade given, under the direct supervision of the inspectors. When the grain is sold and ordered out of the terminal elevator in car or cargo lots, it is again weighed and inspected as it must be "graded out as graded in:" that is, if it was received into the terminal elevator as No. 1, then an equal quantity of grain of the same quality — No. 1 — must be shipped out. In this way the identity of grade of exported grain is carefully preserved through every stage of its journey.

The principal inspection point for Western grain is Winnipeg; in the Eastern division, the inspection points are at Toronto and Montreal. The work is done by inspectors who are qualified by an examination held by the Board of Grain Examiners appointed by the Board of Grain Commissioners.

All grain is sold, both at home and abroad, not according to sample, but only on the grade given by the Dominion Inspectors. The grading of wheat is based entirely on its

[1] 2 Geo. V., c. 27.

physical qualities, weight per bushel, colour and plumpness. Diseases, such as smut and blemishes caused by unfavourable weather conditions, are taken into account.

Under the Canada Grain Act,[1] grain is divided into five classes, viz.: "No grade," "Condemned," "Rejected," "Commercial grade," and "Statutory grade."

Grain of the highest quality falls into the "statutory grades" which are defined by the Grain Act. There are four statutory grades for Manitoba spring wheat, three each for Alberta red and white winter wheats and two for Alberta mixed winter wheat. There are similar statutory definitions of the highest grades of oats, barley, rye, etc.

The statutory definitions are constant and can only be changed by Act of Parliament. The commercial grades, on the other hand, are fixed by the Standards Board and may vary from year to year with the crop.

"Commercial grade" includes grain which, because of climate or other condition, cannot be included in the grades provided for in the Canada Grain Act. For instance, the grain of one year may vary from that of the preceding year, so that a certain proportion of it cannot be dealt with under the grades laid down in the Act and must be provided for by grades defined by the Standards Board, which is appointed under sections 48-51 of the Canada Grain Act.

The Canada Grain Act defines four statutory grades of Western spring wheat: — No. 1 Hard; No. 1 Northern; No. 2 Northern; No. 3 Northern. The Standards Board has defined three additional commercial grades: — No. 4 Northern, No. 5 Northern and No. 6 Northern. But wheat of any of these grades may fall under the general categories of "no grade," "condemned" and "rejected."

"Rejected grain" means all grain that is unsound, musty, dirty, smutty, or sprouted, or that contains a large admixture of other kinds of grain, seed or weeds, or that for any other cause is unfit to be classed under any of the recognized grades.

"No Grade" includes all good grain that has an excessive moisture, being tough, damp, wet or otherwise unfit for warehousing.

"Condemned grain" is all grain that is in a heating condition or is badly bin-burnt, whatever grade it might otherwise be.

The British buyer in England buys and pays for Canadian wheat on the strength of the Canadian Certificate Final. Complaints have been made that the wheat as delivered in

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[1] 2 George V., c. 27.

England has not been of the quality given on this certificate. The shipments which were reported as unsatisfactory had been consigned to England via Buffalo and some United States North Atlantic port.[1] It was claimed that somewhere along the route a quantity of United States soft wheat had been injected into shipments of Canadian hard wheat. No complaints have been made touching grain shipped through Canadian channels and out of Canadian ports. Nor have shipments from New York been unsatisfactory. The cargoes reported were shipped from Baltimore and Philadelphia, though adulteration might have occurred earlier at the port of entry into the United States. These complaints were laid before the Board of Grain Commissioners of Canada and the Royal Grain Inquiry Commission, and investigations were made into the precautions taken to preserve Canadian wheat from adulteration while passing in bond through the United States.

The duty of supervising the shipments of grain in bond through the United States devolves upon the United States Customs Department and after complaints had been received, the United States also investigated the system.

While the number of instances of adulteration was not large, the very wide publicity which these accusations received in trade circles and the alarm which they created in Great Britain were significant of the extreme sensitiveness of the British market to any tampering with the quality of grain supplied on the Canadian Certificate Final.

Liverpool is the wheat market of the world, for Great Britain is the largest importer of grain. Prices obtained in the open market there determine the price of wheat on all grain exchanges — less, of course, the cost of transportation to Liverpool.

The most important Canadian grain market is at Winnipeg[2] which has also the distinction of being the largest actual grain market on this continent. In Chicago, Minneapolis, Duluth and other United States grain markets, the market and terminal storage facilities are both in the same city, but the Winnipeg market is unique in being separated by 400 miles from the terminal elevators at Fort William and Port Arthur. Thus the actual market for Canadian grain is in Winnipeg, while the point of delivery on contracts, that is, the point at which prices are based is at the Head of the Lakes.

Wheat is a world commodity, grown, exported and im-

[1] Report of the Royal Grain Inquiry Commission.

[2] James Stewart, in "The Annals" of the American Academy of Political and Social Science.

ported by many countries. Its price, therefore, is influenced by many conditions. If, for example, the European grain crop is light, more will have to be imported by Europe, and if the surplus to be exported from the United States, Canada, etc., remains at an average amount, the price of wheat will tend to rise. On the other hand, a good crop, both in Europe and in the exporting countries, would tend to depress values.

The wheat crop is harvested in different countries in different months all through the year, as shown in the table in Chapter II. The wheat supply of the world is subject to daily changes in weather conditions. A frost in Canada or a drought in Australia or Argentina may vary the world's supply considerably.

The principal Canadian exchanges are, of course, in constant communication by telegraph with each other and with the American exchanges: so that satisfactory or unsatisfactory conditions in one grain growing district are quickly reflected in the quotations on all the exchanges.

The available ocean tonnage also affects the price of the export wheat: for if held for shipment in a seaboard elevator, interest, storage, and insurance on the wheat must be paid by the shipper, who also runs the risk of losing the right market.

The Winnipeg grain exporting firms usually have offices either in Montreal or New York to facilitate the arrangements for ocean transportation. The offices at seaboard ports report any fluctuations in tonnage rates so that the grain may be exported when the cheapest freight rates prevail. The Winnipeg offices secure the grain in store at Fort William and Port Arthur from the elevator and general grain gathering agencies procure the tonnage by lake or rail or both, and forward the grain to the seaboard ports which look after all the business and transportation to Liverpool.

Each agent of an elevator company at a country elevator sends a daily report to its head office at Winnipeg, as to how much wheat or other grain he has purchased. The elevator companies, not wishing to take the risk of a rise or fall in the market, protect themselves by "hedging," that is, by selling wheat for future delivery. When deliveries at country elevators begin in September, the various elevator companies probably expect to be able to deliver at Fort William and Port Arthur during October at the latest. To protect themselves from possible decline in the market before October, those companies sell to other exporters, millers and speculators the October option on the morning after the wheat is bought at the country elevators. The option price, of course,

relates to the highest grade of wheat, No. 1 Northern, in store at Fort William and Port Arthur.

The exporters have quotations daily from their correspondents in importing countries, indicating values there and the prices paid for corresponding grades No. 1, 2, or 3 Northern c.i.f. cost, insurance, freight) at United Kingdom and European ports. If the quotations are in line after allowing for such factors as ocean freight, insurance, inland transportation by lake or rail or lake and rail to the seaboard, together with interest, insurance, as well as shrinkage or loss in transit, the exporters then purchase the October option or any other "future" which best suits the fulfilment of the price indicated or specified by the importing traders. The purchase of a future may be made through the representative of a Canadian miller, who may be buying with the prospect of selling his product to the Canadian consumer, either direct or through the baker in the form of bread. [1]

The Montreal daily papers publish every day the latest quotations on the Winnipeg and other exchanges for cash grains and for futures. The quotations are given in the following form: [2]

Winnipeg Grain Exchange: February 29th, 1924

Fluctuations in grain today were: —

Wheat	Open	High	Low	Close
May	$1.03⅜	$1.03⅜	$1.02⅜	$1.02⅜
July	1.05	1.05	1.04	1.04
October	1.01½	1.01½	1.00¾	1.00¾

Cash prices closed:

Wheat: No. 1 Northern, 99⅛c; No. 2 Northern, 96⅛c; No. 3 Northern, 91⅜c; No. 4, 86⅞c; No. 5, 81⅛c; No. 6, 75⅜c; feed, 70⅜c; track, 99⅝c.

Chicago Grain Exchange: February 29th, 1924

Future prices:

Wheat	Open	High	Low	Close
May	$1.10½	$1.11	$1.10	$1.10
July	1.10¾	1.11⅛	1.10⅛	1.10¼
September	1.11	1.11⅜	1.10⅜	1.10½

Cash prices:

Wheat: No. 2 hard, $1.12 to $1.15¾; No. 3 hard, 1.09¾ to $1.12.

Whether or not hedging and future sales and purchases are beneficial to the grain producer and stimulating to the

[1] James Stewart, in "The Annals."

[2] Montreal Gazette, March 1st, 1924.

grain growing industry, was a question which was brought up before the Royal Grain Commission which is at present (spring of 1924) investigating conditions in the Canadian West. Opponents of the practice, and especially Mr. Aaron Sapiro, of Chicago, who recently visited the West, claim that option dealing is a form of pure speculation and the worst curse to the farmer, except the curse of dumping his crop on the market at harvest. Mr. A. B. Clark, professor of Economics at the University of Manitoba, in testifying before the Commission at Winnipeg, took the opposite viewpoint. He asserted that fall selling was not dumping in the economic sense: that the farmer by hedging, could, and does, protect himself and gets for his grain in the fall any advance that may have accrued to him by holding and selling in the spring.

The movement of the Canadian grain crop is financed by means of the branch bank system of the Canadian banks. They provide approximately $150,000,000 each year for this purpose. This money is obtained largely in the East before the crop begins to move. Funds are called in from New York in which centre the larger banks always have large amounts outstanding on call loans. The circulation of the banks, i.e. their own notes, is also used to a considerable extent. In addition to the authorized circulation, which is limited to the amount of the bank's paid-up capital, the banks may increase their circulation to the extent of 15 per cent of the paid-up capital and reserves by paying interest at 5 per cent per annum upon the excess to the Government.

Loans upon grain are made by the banks, under the provisions 86, etc., of the Bank Act, which specifies the form of security to be taken.

Loans upon grain made by the banks are made either to the farmer, to the country elevator companies, to the commission merchant or to the exporter.[1]

Loans are made to the farmer, upon the security of his grain, when he wishes to hold it for a period before selling. It is claimed that there is no pressure imposed by the banks upon the farmer to sell his grain and repay his loan.

At the beginning of each year's grain harvest, a representative of an elevator company negotiates a credit with a bank. This may range from $50,000 to $3,000,000. The money is advanced to the company only as the grain is purchased from the farmers and is secured by warehouse receipts upon the grain purchased by the elevator company. These loans to the elevator company are repaid as soon as the company sells the grain to the exporter.

The loans to the commission merchants are small in

comparison with loans to elevator companies and are made on the security of bills of lading.

The loans to the exporter are made usually on the security or warehouse receipts which he deposits with the bank as representing the parcel or cargo of grain which he is shipping out. These warehouse receipts are lodged with the Lake Shippers' Clearing Association which give a certificate to the bank that they will hold so much grain for the bank. On account of the warehouse receipts being in the hands of the lake shippers, the shipping bill of a cargo is made in the name of the bank. The exporter then draws on his purchaser with the shipping bill attached and the bank will send his draft forward. When the draft is paid, the shipping bill is surrendered.

In the ordinary course of business the grain remains in control of the banks until it reaches Liverpool, because credit facilities are furnished by them for the ocean transportation which is a separate stage of the movement. The banks do not surrender possession of the grain until they are paid. If the business goes through Montreal or Vancouver, the Canadian banks will thus carry the trade from the producer in the West to the ultimate market in Liverpool. If the grain be shipped via New York or other United States ports, the American exporters will deal with their own banks, who will pay off the loans from Canadian banks.

CHAPTER IV

DEVELOPMENT OF TRANSPORTATION ROUTES IN CANADA

Canada is a land of many rivers.

The first inhabitants of North America, the Indians, found the network of rivers stretching over the entire Continent ideal transportation routes. A portage past rapids, or from one river to another, was an easy matter when the craft, a birch bark canoe, could be carried by one man. When the French settlers first arrived in what we now call Canada, they adopted the Indian mode of travel. Settlements grew up along the banks of the St. Lawrence, and fur trading posts were established at Tadousac, Quebec, Three Rivers and Montreal.

As trade between the settlements increased during the Seventeenth Century, the light, flat-bottomed bateau succeeded the canoe in carrying goods on the St. Lawrence from Quebec to Montreal.

The French did little to improve the rivers for navigation. A few stones were pulled out of the Richelieu and the Sulpicians began work on the little St. Pierre River on the island of Montreal. The contractor went bankrupt, and as the French Government was also in too great financial difficulties to send any help, the work was never completed. Indeed there was little need for improvements. Below Montreal the St. Lawrence was navigable by the largest ocean vessels of the time. South and West of Montreal there was then no settlement. The cargoes of furs brought down the rivers from what is now Ontario were easily carried in canoes.

After the cession of Canada to the English, the military interests insisted on better means of communication along the St. Lawrence, as part of the defence of the new colonies. In 1779 [1] the first canals were begun past the Cascades Rapids, where later the Beauharnois and Soulanges Canals were built.

The Settlement of Upper Canada by the United Empire Loyalists added the commercial voice to the military demand for better means of transportation. It was also hoped that improvement of the St. Lawrence would give Canada a share in the carrying trade between the Western and Eastern States. The Erie Barge Canal begun in 1817 was looked upon as an

[1] Canada and its Provinces, vol. 10; Shipping and Canals, M. J. Patton.

attempt to divert traffic from its natural channel — the St. Lawrence River. The result was the hastening of the construction of a canal past the Lachine rapids which was opened in 1824. The Welland canal, partially opened in 1829, and completed in 1832, was built to avoid the necessity of portaging all freight around Niagara Falls, a most laborious business.

Lt. Col. Phillpotts, who reported to Lord Durham on the canal navigation of the two provinces, recommended the enlargement of all canals between Lake Erie and tidewater. After the Union of the Provinces work on the canals went ahead rapidly. The Welland canal was enlarged in 1841, and the Lachine canal in 1843. The Beauharnois canal opened in 1845, the Cornwall canal was completed in 1843, the Williamsburg canal in 1847. Thus the whole of Canada's present canal system, except the Sault Ste. Marie Canal (opened in 1895), was completed. Since then the only work has been the enlargement of existing canals, to meet the requirements of larger vessels and increased traffic.

Highways were of late development in Canada, for in winter the roads were over the frozen rivers and in summer all traffic was by water. At the end of the 18th century the construction of highways was begun in Upper Canada under the direction of Governor Simcoe. Yonge Street was planned to provide an overland link between Lake Ontario and Georgian Bay and thus to shorten the route to the western trading posts. This road was opened from York (Toronto) to Lake Simcoe in 1796 [1] and later completed. By 1800 there was a good coach road between Montreal and Quebec. In 1816 the road from Montreal to Kingston was opened and a year later from Kingston to Toronto. Though well built, the roads were not kept in repair and travel over them was slow and extremely uncomfortable.

Great interest was taken in Canada in the beginning of railways in England and the relative merits of canals and railways were discussed with much animation. It was thought probable, at first, that railways in Canada would be obliged to stop during the winter on account of the snow, though a suggestion was made that the rails might be raised three feet from the ground, thus avoiding drifts.

The first railway opened in Canada was the Champlain and St. Lawrence, which ran from Laprairie to St. Johns. This short line was an important link in the route between Montreal and New York, for it connected the navigation of the St. Lawrence river (through the Richelieu river) with that of Lake Champlain and the Hudson. Although chartered in

[1] History of Simcoe County: A. F. Hunter.

1832[1] work was not begun until 1835, and in the year following the railway was opened with horse-drawn cars running over wooden rails with a strap of iron on the top. In 1837 steam locomotives were used for the first time, but iron rails were not laid down until ten years later.

In Upper Canada the immigration from Great Britain after 1825 gave a great stimulus to railway schemes in that Province. Their first charter was granted to the Cobourg Railway in 1832, the same year as the Charter of the St. Lawrence and Champlain in Lower Canada. Upper Canada was lavish in chartering, for before 1837 no less than three charters[2] had been granted for parallel lines between Lake Huron and Lake Ontario. But the charters were not followed by railway construction; the Government offered grants, but this was not enough to attract capital. The constitutional difficulties which culminated in the Rebellion of 1837, the falling off in immigration and the financial crisis in both the United States and Canada were all discouraging to railway enterprise.

With the Union of the Provinces, an improvement was hoped for, but the forties proved to be a hard period for Canada. Great Britain abandoned her policy of protection which greatly upset Canadian trade.

The Canadian milling industry had grown up under the Canada Corn Bill of 1843[3] which gave Canadian grain and flour a preference in British markets. This measure was designed to divert the grain of the United States to Canadian waterways, and indeed much United States grain was milled in Canada to get the benefit of the preference. All this was, of course, swept away when Great Britain adopted Free Trade.

In 1845 the granting of bonding privileges by the United States drew more traffic away from Canada to the Southern routes. Ocean rates from New York were cheaper than the Montreal rates, but a more important reason was that in the States the railway had already taken the place of the slow canal.

While the United States had a comprehensive scheme of railways, there was as yet none in Canada. The lines built were short and for local traffic only. The Lachine railway, taking the place of the stage from Lachine to Montreal was begun in 1846 and opened in 1847. The St. Lawrence and Industry ran from the St. Lawrence river to Joliette. In

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1. 2 Wm. IV., c. 58 (1832).
2. 4 Wm. IV., c. 28; 4 Wm. IV., c. 29.
3. 6 Vic., c. 31, Canada (1843); 6 and 7 Vic., c. 29, Great Britain.

Ontario, the Erie and Ontario, the only railway, was in 1848 a horse drawn train car from Queenstown to Chippewa.

Portland had for some time been anxious to secure rail connection with Montreal. John A. Poor, an enthusiast on railways, fired the ambition of the State, and in 1836 Maine granted a charter to the Atlantic and St. Lawrence to run from Portland as far as the Canadian boundary. As long as Montreal enjoyed British preference, the merchants were indifferent to the proposed Portland route. But as the preference vanished, the propaganda of Poor and the complaints of the farmers in the Eastern Townships combined to secure in 1845 the charter of the St. Lawrence and Atlantic.[1] which was to connect at the border with the Atlantic and St. Lawrence. In December, 1848, the railway was open from Montreal to St. Hyacinthe.

Railway construction received Government help from Francis Hincks, at that time Inspector-General of Canada, who saw that transportation facilities were necessary before settlement could be increased and that the difficulties in the way of railway construction were too great to be borne altogether by private capital. In 1849, by the Guarantee Act[2] the Government guaranteed interest at 6% on a sum not exceeding half the bonded debt of a railway over 75 miles long, one half of which had been constructed. Any payments of interest by the Government were to be secured by a first charge after the lien of the bondholders. No dividends were to be paid while any part of the principal on which interest had been guaranteed was outstanding until the repayment of such principal had been secured by the establishment of a sinking fund. Two years later this Act was limited in scope to the Great Western, and St. Lawrence and Atlantic and the Northern, so that too great a strain might not be put upon public credit.

Hincks was responsible for the creation of the Municipal Loan Fund 1852[3] by which the credit of various municipalities was used to raise money for railway construction. In Upper Canada, especially, taxation for railway building was considered a very profitable form of investment and many towns borrowed so heavily that they could not meet their obligations. Although the Canadian Government declared that it was not responsible, it made advances to allow the fund to meet the interest due to the bondholders, and finally

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1 8 Vic., c. 25 (1865).
2 12 Vic., c. 84; 12 Vic., c. 29, 1849; 14 and 15 Vic., c. 73.
3 16 Vic., c. 22, c. 123; 18 Vic., c. 13; 20 Vic., cc. 20 and 42.

in 1859[1] the fund was closed and the Government had to assume £3,000,000 of obligations outstanding against it. Lower Canada, of a more cautious temperament, did not invest in railways to nearly the same extent as Upper Canada.

The Grand Trunk Railway was chartered in 1852[2] and 1853. The prospectus was issued in London written in terms of glowing enthusiasm; the working expenses of the road were to be 40% of the earnings, the profit 11½% on the share capital.[3] The plan called for 1,212 miles of railway from Sarnia to Toronto, to Montreal, to Richmond, Portland, Quebec and Trois-Pistoles. The total capital was £9,500,000 in shares and debentures. From this were to be deducted sums spent already on the Quebec and Richmond and St. Lawrence and Atlantic Railways; also shares and debentures set aside for the shareholders of these lines and for the bondholders of the Northern Railway. The sum of £7,246,000 was left for issue.

The construction of the Grand Trunk Railway was to be of the best — not scamped as the Great Western had been. Nevertheless, as first built, the Grand Trunk Railway road was rough and full of sharp curves in spite of reckless expenditure. The road was continually in financial difficulties and the Government had to come to its aid repeatedly.[4] The completion of the line failed to improve conditions and in 1862[5] the Company was reorganized and its bond issues converted into preferred stocks. Connections to Chicago enabled the Grand Trunk Railway to bid more effectively for through traffic. In 1884 it absorbed the Great Western Railway which strengthened its position for the time being.

The ambitious scheme of an intercolonial railway was first discussed at St. Andrews, New Brunswick, in 1828. The proposed line was to run from St. Andrews to Quebec and would thus provide a means of communication in winter when the St. Lawrence river was closed. Resolutions were passed in favour of the project by the Legislatures of both New Brunswick and of Nova Scotia. The scheme was of such a magnitude that an appeal was made to the Imperial Government for Imperial aid. A grant of £10,000 was made in 1836 to cover the cost of a systematic survey. Unfortunately the political discontent which was then rife in Lower Canada caused the railway to be looked upon with scant favour. The award in the Maine

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1 22 Vic., c. 15 (1859).
2 16 Vic., cc. 37, 38 and 39.
3 History of the Grand Trunk Railway. T. S. Brown.
4 18 Vic., c. 174; 19-20 Vic., c. 111 (1857); 20 Vic., c. 11 (1857), etc.
5 25 Vic., c. 54.

Boundary dispute rendered the proposed route impossible as it lay within the territory awarded to the United States.

The Rebellion in the Canadas, however, showed the need of transportation facilities for the defence of the colonies. Lord Durham also strongly recommended an intercolonial railway on political as well as commercial grounds.

The St. Andrews and Quebec route was succeeded by a proposal for a line from Halifax to Quebec. In 1847 Major Robinson, an Imperial Officer, surveyed the route which for political reasons ran as far as possible from the United States boundary. Negotiations for Imperial aid continued, but as the commercial future of the road was extremely doubtful, arrangements were difficult.

The situation was complicated by the European and North American project which intended to link up Nova Scotia and New Brunswick with Portland, Maine. This line was looked upon with suspicion and an attempt to draw the British colonies into the United States. Nova Scotia and New Brunswick began construction on their sections of this line, but public men had not given up the idea of an intercolonial railway. Joseph Howe went to England to get help and apparently had succeeded, but owing to misunderstanding over the route chosen, the negotiations fell through in 1852. The dream was not given up and in 1857 John A. Macdonald and John Rose elicited help from the Home Government. The final result was that the Intercolonial Railway was made part of the Confederation terms. [1]

Work was begun in 1869. The Dominion Government took over the sections of railway which had previously been built by the Governments of Nova Scotia and New Brunswick, and in 1876 the whole line was complete. The route followed was that recommended by Major Robinson. The Intercolonial Railway has never paid as a commercial railway, but it was built primarily for military and political reasons.

Immediately after Confederation Canada purchased the lands of the Hudson's Bay Company and established the Province of Manitoba.[2] The Red River Rebellion of 1869-70 brought home to Canada the need for adequate transportation facilities between the Eastern provinces and the new territory in the West.

In 1871,[3] when British Columbia joined the Federation, one of the conditions was that a transcontinental railway

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1 30 Vic., c. 3, Sec. X, 145.
2 33 Vic., c. 3 (1870).
3 Order-in-Council, May 1871.

should be built within ten years to link this province up with the others in the East. The rapid expansion westward of the United States caused Canadian statesmen to fear that the Canadian prairies would become settled by Americans and finally be joined to the United States. The disputes over the Canada-United States boundaries added to their apprehensions. The building of American railroads in the West made it clear that unless Canada built a line on her side of the boundary Canadian trade would go by way of St. Paul, Minneapolis, and Chicago. Practical as well as political reasons thus urged the immediate construction of a railway into the Canadian West. The railway which was built gave tangible evidence of the union of British North America, held for Canada the territories between Manitoba and the Rocky Mountains, opened up an immense territory for colonization and checked the drift to American cities.

The history of the Pacific Railway between 1870-1880 is a record of rivalry between competing contractors, competing policies of construction and unsuccessful attempts to carry the work forward. The Liberal Party, then in opposition, criticized the project as likely to burden the Eastern provinces with undue taxation. They recommended the building only of links between the navigable waterways until the West had developed sufficiently to provide traffic enough for a through line of railway. The Conservative Government pressed forward with the scheme and two companies were incorporated.[1] The Pacific scandal over the elections of 1872 brought defeat to the Conservatives and the Liberals had an opportunity to build the line as they thought it should be done. Their policy of utilizing the water stretches to give a combined water and rail system between the Eastern and Western provinces met with little success. British Columbia protested at the breach of agreement. No Company would undertake the contract for the line from Winnipeg to Lake Superior, one of the important links. The Pembina Branch South from Winnipeg was finished in 1878 and gave an all rail route from Winnipeg to Montreal via St. Paul and Chicago.

On the return of the Conservatives in 1879, a series of resolutions were passed reaffirming their original plan of building a line from East to West without delay. For a short time they were compelled to continue their predecessors' policy of Government construction. In December, 1880, after lengthy negotiations, the Government submitted to Parliament

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[1] The Canadian Pacific Railway, 35 Vic., c. 73;
The Interoceanic Railway, 35 Vic., c. 72 (1872).

a contract with the Canadian Pacific Railway Company to build a road from Lake Nipissing to the Pacific Coast. The contract was ratified early in the following year. The terms of the agreement were very good for the new company; the Government gave them the sections of the road already completed or under construction, a money grant of $25,000,000 and a land subsidy of 25,000,000 acres of land. An important clause shut off any competition from United States railroads by providing that for twenty years no line of railway should be permitted to be constructed in the Canadian West south of the Canadian Pacific Railway within fifteen miles of the United States boundary. Other privileges which the Canadian Pacific Railway was given were the freedom from taxation, and the remission of customs on construction supplies.

The construction of the road was undertaken with such celerity that in 1885 the last spike was driven and in the following year, 1886, the first train ran from Montreal to Vancouver.

While constructing the main line in the West, the promoters of the company were busy securing control of desirable connections in Eastern Canada. In 1883 the Canadian Pacific Railway obtained extensions to Montreal and to Brockville. It leased the Ontario and Quebec Railway and in 1885 absorbed the North Shore Railway, thus gaining access to Quebec City. In 1887 a short line from Montreal to St. John, New Brunswick, was authorized. Arrangements were made in the United States with the St. Paul, Minneapolis and Sault Ste. Marie and with the Duluth, South Shore and Atlantic Railways, bringing these important lines within the influence of the Company. Development and extensions have thus continued unabated from the beginning to the present time.

The Grand Trunk Railway regarded the Eastern expansion of the Canadian Pacific Railway with jealous surprise, although the opposition of the older railway did not retard the growth of its rival. The Grand Trunk Railway was forced to watch the development of a powerful rival which competed with it in Ontario and had a reserve of strength in the increasing traffic on its Western lines. The Grand Trunk Railway began to see what an opportunity they had lost in refusing to accept the contract to build a Pacific railway; the Liberal Party understood how much they had underestimated the possibilities of the Canadian West. When, therefore, the extraordinarily rapid development of the prairies at the beginning of this century began to tax the facilities of the Canadian Pacific Railway, the project of a second transcontinental line was conceived.

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1 44 Vic., c. 1 (1880).

The scheme was endorsed as likely to promote further development of the Canadian West. In many parts of the West there was considerable feeling that the Canadian Pacific Railway was charging too high freight rates and it was felt that the competition of an independent line would improve rates. It was also urged that if another line were not built much traffic would be lost to Canada by being carried over United States railways.

The project necessitated an agreement between the Grand Trunk Railway and the Dominion Government.[1] This provided that the road was to consist of two sections from Moncton, New Brunswick, to Winnipeg, 1,800 miles, and from Winnipeg to the Pacific, 1,756 miles. The Eastern division, called the National Transcontinental, was to be constructed by the Government of Canada and leased for fifty years to the Grand Trunk Pacific Railway for operation. The Western division, the Grand Trunk Pacific, was to be built by that company under a bond guarantee of three-fourths of the cost of construction. This was limited to a cost not exceeding $13,000 per mile. Under an implementing clause, the Government agreed to make up the difference between the amount realized in certain bonds and their par value. In the case of the mountain division the Government further agreed to pay the bond interest for seven years.

The expenditure on both sections of the railway far exceeded the estimated costs. In November, 1913, the Eastern division was completed, but was never taken over by the Grand Trunk Pacific. The strain of financing the western line was too great for the Grand Trunk Railway. In 1915 they suggested to the Prime Minister of Canada that the Dominion Government should take over the Grand Trunk Pacific.

The third transcontinental line, the Canadian Northern, began an amalgamation to take over a couple of small railways in Manitoba in 1898.[2] Under the direction of two ambitious railway men, Messrs. Mackenzie and Mann, the company leased several other short lines in Manitoba and formed the nucleus of a system.[3] In 1902 power was obtained to build Eastward to Ottawa and Montreal and Westward by Edmonton and the Skeena River to the Pacific Coast.[4] Thus the Grand Trunk Railway was developing Westward and building into the rich and rapidly developing agricultural areas of the

1 3 Edward VII., c. 122 (1903).
2 62-63 Vic., c. 57 (1900).
3 1 Edward VII., c. 52 (1901).
4 2 Edward VII., c. 50 (1902)

West while at the same time the Canadian Northern Railway was securing outlets in the East. A fusion of these interests would have been the logical conclusion, but unfortunately this did not take place. The Grand Trunk Railway obtained the financial support of the Canadian Government by agreeing to a national transcontinental line to Canadian Maritime ports. Although for the first ten years of the history of the Canadian Northern Railway construction work centered in Western Canada, yet the desire to build Eastward was never relinquished. Control of certain lines in Eastern Canada was obtained. In 1911 guarantees were secured from the Dominion Government [1] for a bond issue to enable a connecting link to be built between Montreal and Port Arthur. Construction continued until the Canadian Northern Railway extended from Quebec to Vancouver, and reached Duluth, Toronto, Ottawa and Montreal, and covered the prairie provinces with a large number of branches. The finances of the company became weaker and weaker. In 1914 a bond issue of $45,000,000 at 4% was guaranteed and at the Session of 1916 it received a loan of $15,000,000.

The financial difficulties resulting from the construction of the two later transcontinental lines led the Dominion Government to appoint in July, 1916, a Royal Commission to inquire into railways and transportation in Canada. The result of this was that the Grand Trunk Railway with the Grand Trunk Pacific and Canadian Northern Railways were taken over by the Dominion Government and, with the Intercolonial Railway, were operated as the Canadian National Railways.

Railway rates in Canada are under the control of the Board of Railway Commissioners which was created by the Railway Act of 1903. [2] The Board as it now exists consists of six Commissioners appointed for ten years. It has power to inquire into, hear and determine any complaints arising out of a failure to fulfill the requirements of the Railway Act" or any special Act or regulation made thereunder by the Governor-in-Council, the Minister, the Board or any inspecting engineer."

The powers of the Board as exercised includes the supervision of the initial location of lines, sidings, and switchings, with inspection by one of the Board's engineers before they are open for traffic; an inspecting engineer may forbid the operation of a line until alterations, substitutions, or repairs are made thereon.

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1 1-2 Geo. V., c. 6.
2 7-8 Edward VII., c. 61, sections 314 ff.

The regulations for safety and convenience of operation, include the general requirement that every railway shall use modern equipment and efficient apparatus, and the Board has the authority to determine when the apparatus is efficient.

The powers of the Board in matters of freight classification, tariffs and tolls are set forth in forty-seven sections of the Act of 1908. The Board has complete authority over freight classification.

Tariffs are divided into three classes: the standard freight tariff, special freight tariffs and competitive tariffs. All these must be filed and approved by the Board. Joint tariffs are to be filed by the initial company and the other companies affected must notify the Board of concurrence. In case of agreements concerning carriage by water, between Canadian ports with railway connections, commodities shall be deemed to be carried by a continuous route. When there is a failure of two or more companies to agree to a joint tariff, for what the Board considers "a reasonable practicable route," the Board may by order determine the route, fix the tolls and apportion the same among the companies interested. Joint tariffs for international traffic must also be submitted to the Board for approval and authorization.

The Board does not originate rates, but may indicate in a given instance what would be a reasonable charge. In cases of complaints about rates, the onus of their reasonableness lies upon the railway.

CHAPTER V

PRESENT GRAIN ROUTES AND RATES

From the wheat fields in the prairie provinces, wheat may be sent eastward to Fort William and Port Arthur at the Head of the Lakes; or it may be moved westward, Canadian wheat having recently found a new point of export in the port of Vancouver.

Vancouver, the finest harbour in British Columbia, opens off the Strait of Georgia into Burrard Inlet, a few miles northeast of the mouth of the Fraser River. By Act of Parliament of May, 1913,[1] the Harbour of Vancouver was placed under the jurisdiction of a harbour commission of three members, the Act being a copy of the Montreal Harbour Commission Act.

The opening of the Panama Canal made possible shipments to Europe via the Pacific-Panama route. The ocean voyage is, of course, long and the grain has to pass through the tropics. On account of this it was at first feared that the shipments would be inclined to sprout during the voyage. Experience has shown that this is not the case.

The wheat exported from Vancouver is graded more strictly than that which passes through Winnipeg. Consequently, hard wheat shipped to Europe via Vancouver is superior, grade for grade, to shipments of similar wheat shipped via either United States or Canadian Atlantic ports.[2] This is especially marked in the grades from 3 to 6. In the trade, wheat shipments received from Vancouver are spoken of as "Vancouvers." Vancouvers of grade 3 are considered nearly as good as Atlantic 2 and Vancouver 4 nearly as good as Atlantic 3. The difference in quality is marked in the goldness and redness of the berry and the lower moisture content. The British miller considers Vancouvers so much superior to Atlantics that he is willing to pay from sixpence to a shilling per quarter more for the same grade shipped via the Panama route than for shipments received from Atlantic ports. With the evident popularity in Britain of wheat shipped by this route, Vancouver's exports to Europe should increase steadily.

Canadian exports of wheat and flour to the Orient are

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[1] 2 Geo. V., c. 27.

[2] Report of the Royal Grain Inquiry Commission.

of course shipped through the port of Vancouver. The growing consumption of wheat in China and Japan must result in increased imports of Canadian grain and flour. As yet, however, the Oriental demand for wheat depends largely on the success or failure of the rice crop.[1] Wheat is purchased only when rice is comparatively dear and wheat relatively cheap. This situation tends to make the Oriental imports fluctuate considerably from year to year.

Another advantage which the Pacific port has over its Eastern competitors, is that while they are blocked with ice during the winter season, Vancouver can ship grain all the year round.

The year 1921 marked the beginning of the export of wheat from Vancouver and in the crop year 1921-1922, 7,837,-171 bushels were shipped. The following year, 1922-23, 17,-829,687 bushels of wheat were exported, of which 10,506,635 were sent to the United Kingdom, and the remaining 7,323,-052 bushels to other countries.[2]

The Harbour Commissioners of Vancouver are fully alive to the future possibilities of their port. Elevator expansion is going on rapidly. The Government's elevator is being increased to a total capacity of 808,000 bushels, and a new elevator is being constructed to hold 2,000,000 bushels, which it is expected will be ready for the 1924 crop. By that time it is hoped that the total storage accommodation of the port will have reached 5,000,000 bushels.

In a short time Vancouver expects to be shipping from 100,000,000 to 150,000,000 bushels of grain per year, as it is claimed that lack of storage space alone has hampered the growth of the traffic.

A certain part of the grain growing section of Canada appears to be tributary to the Port of Vancouver: the crop of most of the province of Alberta and of some sections of Western Saskatchewan seems to flow naturally to the Pacific.[3]

A factor in developing the export grain trade of Vancouver is the securing of differential rail rates from these wheat growing regions over the mountains to tide-water.

Present rates to Vancouver per 100 pounds of export wheat in carload lots from various points in the West are:[4]

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[1] Report of the Royal Grain Inquiry Commission.
[2] Agricultural and Industrial Progress in Canada, March, 1923.
[3] Report of Harbour of Montreal, 1922.
[4] C. N. Rys. (W.L.) Tariff 135-C.

From	Rate
Edmonton, Alberta	22½
Calgary, Alberta	22½
St. Paul, Alberta	25
Battleford, Saskatchewan	28½
Loverna, Saskatchewan	28

When the movement of grain on this route is established and these rates are stabilized, a sort of watershed will become defined, from one side of which it will be cheaper to ship grain via the Pacific and from the other side via the Eastern ports.

Some people fear that the development of Vancouver as an export point for Canadian grain will have an adverse effect on the shipments from the port of Montreal. The Harbour Commissioners of Montreal have no such apprehensions. The area from which the St. Lawrence-Montreal route derives its traffic is so extensive that the problem of this port will be to keep the facilities for grain export equal to the demands made on them.

Of the wheat that is shipped eastward, by far the larger amount is sent by rail from the country elevators to Fort William and Port Arthur. Duluth receives a small quantity of Canadian wheat both by rail and water. From Duluth the grain may follow any one of the lake or rail routes and may be shipped to Europe from any of the Canadian or United States ports.

From Winnipeg to Fort William, 420 miles, wheat for export is forwarded in carload lots for 14 cents per 100 lbs.[1] Here the Canadian shipper has the advantage over the United States grain fields to Duluth. From Leeds, North Dakota, to Duluth, a distance of 417 miles, the rate is 20½ cents per 100 lbs. of export wheat.[2] For longer hauls the Canadian has a still greater advantage. Wheat may be sent from Calgary to Fort William, 1,243 miles, for 26 cents per 100 lbs.[3] The rate for a corresponding distance in the United States, from Rexford, Montana, to Duluth, 1,254 miles, is 51½ cents per 100 lbs. of wheat[4] — almost 100 per cent higher.

The following table gives rates on export wheat (carload lots) from various important points in the Canadian wheat fields to Fort William and Port Arthur; also rates over

[1] C. N. Railways. (W. L.) Tariff 183-B.
[2] Figures supplied by the Canadian Pacific Railway.
[3] Canadian Pacific Railway Tariff.
[4] Figures supplied by the Canadian Pacific Railway.

American roads to Duluth from points in the American wheat fields corresponding in distance. The advantage of the Canadian shipper can be seen at a glance.

To Fort William [1] from	Miles	Rates per 100 lbs. of wheat	U. S. Rates per 100 lbs. of wheat for corresponding distances
Winnipeg	420	$0.14	$0.20
Portage La Prairie	475	.15	.23
Carberry	525	.16	.23½
Brandon	553	.16	.26½
Verden	600	.16	.27
Broadview	684	.18	.31
Yorkton	699	.19	.31
Wolseley	715	.19	.32
Regina	776	.20	.35
Moose Jaw	818	.20	.36
Swift Curent	929	.22	.39½
Maple Creek	1,013	.23	.43
Medicine Hat	1,076	.24	.45½
Grassy Lake	1,125	.25	.46½
Bassano	1,165	.25	.48
Lethbridge	1,177	.25	.48
Calgary	1,243	.26	.51½

When in the terminal elevators at the Head of the Lakes grain may be sold to a number of different markets. It may be sold to Liverpool; it may find a market in the United States, or it may be bought by millers in Eastern Canada. When stored in the elevators at Fort William and Port Arthur grain may proceed to its ultimate destination by either the United States or Canadian channels, by water routes or by rail routes or by lake-and-rail routes. For these reasons the Fort William route is likely to remain more popular than the Vancouver route. Grain at Vancouver has not yet got the choice of such a variety of markets though this may grow as exports to the Orient and South America increase. The Hudson Bay route would be under a great disadvantage as grain at Port Nelson could only be shipped to the Liverpool market. The offers of American and Eastern Canada millers would be lost to the grain shipper whose wheat was routed via the Hudson Bay.

From Fort William and Port Arthur, Canadian export grain may be carried to the seaboard over a variety of routes:

[1] Figures kindly supplied by the Canadian Pacific Railway Offices.

all-water, lake-and-rail, and all-rail. It may be shipped to Europe from many Atlantic ports.

Although the St. Lawrence canals at present accommodate vessels of no more than 14-foot draft yet a certain amount of grain is shipped from the Head of the Lakes direct to Europe. During the navigation season of 1923, 196,300 bushels [1] of wheat were shipped from Fort William and Port Arthur direct to Europe. Compared with the total shipments of wheat by water from the Head of the Lakes, which for the same period amounted to 244,577,669 bushels,[2] this is a very small quantity.

Some wheat is shipped by the all-water route from Fort William to Quebec and Montreal where it is transshipped to ocean vessels. During the season of 1923, Fort William and Port Arthur shipped by water to Quebec 494,507 [1] bushels and to Montreal 6,060,676 bushels of wheat.[3] It is not possible to cite any one rate as representing the rates on export wheat shipped by water from Fort William. They are not under Government control, as are rail rates. The rate for water carriage varies from day to day during the season, according to the amount of grain to be shipped and the demand for space on a vessel. The statement may be made that the rate on wheat for export from Fort William to Montreal ranges from 5 to 11 cents per bushel.

By far the largest part of the wheat shipped from Fort William and Port Arthur is carried to ocean ports partly by water and partly by rail. The consignments are shipped by lake boats to ports on the Georgian Bay, on Lake Huron or Lake Erie and from there are forwarded by rail to the export point. During the season of 1923, there was shipped by water from Fort William to Canadian Lake and Bay ports a total of 113,621,033 bushels of wheat. [4]

Lake Shipments of Wheat from Fort William and Port Arthur during the Season of Navigation 1923 [5]

To Canadian Lake and Bay ports:	bushels
Depot Harbour	2,070,160
Goderich	12,923,295
Midland	14,059,784
Port Colborne	45,368,950
Port McNicoll	19,745,226
Port Stanley	405,670
Tiffin	18,058,924

[1] Report on the Grain Trade of Canada: 1923.
[2] Ibid.
[3] Ibid.
[4] Ibid.
[5] Ibid.

The total shipments of wheat by water from the Head of the Lakes to all the Canadian ports during the season of 1923, amounted to 119,187,192 bushels.

In the same year, 1923, a greater quantity was shipped by water from Fort William and Port Arthur to United States Lake ports than to Canadian ports. Buffalo received 100,540,988 bushels[1] of wheat, a far larger amount than any other inland port.

Lake Shipments of Wheat from Fort William and Port Arthur during the Season of Navigation 1923[2]

To United States Ports	Bushels
Buffalo	100,540,988
Chicago	198,762
Cleveland	278,555
Detroit	564,861
Duluth-Superior	1,773,677
Erie	9,261,954
Fairport	2,082,556
Port Huron	651,159
Toledo	9,841,665
Total	125,194,177

Although Buffalo receives such a large amount of Canadian wheat, the other American ports receive small amounts, so that the total shipments to the United States ports do not greatly exceed the total shipments to Canadian ports.

The rates for transportation by water from the Head of the Lakes to Lake or Bay ports vary from day to day, just as the Fort William to Montreal rate, depending upon the quantity of grain to be shipped, etc. In May 1924, the water rate between Fort William and Port Arthur and Georgian Bay ports was about 7½ cents per 100 lbs. of export wheat. Although, as a rule, the rates from Fort William to Buffalo are a shade less than to Bay ports, on the latter (the Canadian) route, the boat pays the charges for transfer from the boat into the elevator, while on the Buffalo route the shipper has to pay the charges. This makes the rate on the two routes about equal. In May, 1924, the rate from Fort William to Buffalo fluctuated from 6.2 to 6.6 cents per 100 lbs.[3] The

[1] Report on the Grain Trade of Canada: 1923.
[2] Ibid.
[3] Kindness of R. W. Oliver, Esq.

charges for unloading the wheat from the boat into the elevator amounted to one cent per bushel.

Grain which is carried by water to Canadian Bay ports, such as Depot Harbour, Goderich, Midland, etc., may be forwarded to Montreal by rail. This lake-and-rail route, though it is more expensive than the all-water route from the Head of the Lakes to Montreal, has the advantage of being quicker. Any delays on the crowded St. Lawrence canals are avoided so that grain shipments are in less danger of being held out by winter conditions. The port of Montreal closes about December 1st; practically nothing can be shipped to this port after the middle of November with any certainty of being transported across the Atlantic before navigation on the St. Lawrence closes for the season. The comparatively early closing of this port, cutting as it does the latter half of the grain shipping season, is a serious disadvantage; but in spite of it, more grain is shipped out of Montreal during the short season than out of any other North American port.

The rail rate on carload lots of export grain from Bay ports to Montreal is 14.34 cents per 100 lbs.[1] Montreal received by rail, during 1923, 33,314,170 bushels of wheat.[2]

When the port of Montreal is closed, Canadian wheat, in store in elevators at Canadian Bay ports, may be shipped by rail to Portland, which is open all the year round and is especially used as a winter port. The rate on carload lots of export wheat from Georgian Bay ports to Portland is 15.17 cents per 100 lbs. This is barely one cent per 100 lbs. more than the Georgian Bay-Montreal rate and is the same rate as that between Buffalo and New York. Yet the amount of grain exported through Portland is not great:

1918	20,752,240	bushels[3]
1919	14,873,522	"
1920	9,967,733	"
1921	12,184,027	"

These figures are for the calendar year. During the crop year 1922-23, Portland handled a large quantity of Canadian grain. The elevators at that port received 21,746,166 bushels and of this 21,432,545 bushels were shipped out.[4]

St. John, N.B. is another ocean port available for wheat shipment when Montreal is icebound. The rail rate from Georgian Bay ports to St. John is the same as from these ports to Portland; i.e., 15.17 cents per 100 lbs.[5] The rate for

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[1] C. N. Rys. Tariff CK-7.
[2] Report of the Montreal Board of Trade, 1923.
[3] Debates of the House of Commons, March 26th, 1924.
[4] Report of the Canadian Grain Trade, 1923.
[5] Figures supplied by the Canadian Pacific Railway.

the all-rail route from Fort William to St. John is 36½ cents per 100 lbs. of export wheat in carload lots.[1] The season for shipments from St. John is from about the middle of December to the middle of April. The Canadian Pacific Railway gives the following figures for export of wheat from this port during their fiscal year (April 1st to March 31st):

1921-1922	6,474,839	bushels
1922-1923	6,604,898	"

The total amount of grain handled through St. John for the crop year 1922-1923 amounted to 15,940,148 bushels: this figure includes the carryover from the previous year. The shipments for overseas amounted to 15,915,245 bushels, while a small quantity, 21,644 bushels, was consumed locally.[2]

The popularity of Buffalo as a lake port is due to the fact that from this port grain may be forwarded by rail to Boston, New York, Philadelphia or Baltimore, all of which are open all the year round. From these ports, especially from New York, favourable ocean rates are obtainable. The rate on carload lots of export wheat per 100 lbs. from Buffalo to Boston or New York is 15.17 cents.[3] This is just the same rate as between Georgian Bay ports and Portland. From Buffalo to Philadelphia or Baltimore, the rate on carload lots is 14.67 cents per 100 lbs. of export wheat,[4] which is equal to the rail rate between Georgian Bay ports and Montreal.

Since transport by water is so much cheaper than by any all-rail route every shipper tries to bring his grain as near as possible to the seaboard before navigation closes on the Great Lakes. This means a heavy traffic on all the grain routes during the autumn. As soon as possible after its arrival at Fort William and Port Arthur, all grain must be shipped out to make room for new receipts. All ports on Georgian Bay and on the Lakes provide elevators in which the grain received from the lake vessels can be stored until it is forwarded by rail. The elevator facilities are further augmented by filling up the last vessels entering port at the beginning of winter and storing grain in them. Buffalo has a great advantage over all the other Lake and Bay ports in

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[1] Figures supplied by the Canadian Pacific Railway.

[2] Report of the Canadian Grain Trade, 1923.

[3] Trunk Line Tariff I.C.C.A.104.

[4] Ibid.

respect to elevator capacity. The capacity of the elevators at Buffalo is 25,000,000 bushels.

Wheat in store at Canadian Lake and Bay ports is at a disadvantage because the choice of winter ports to which it may be forwarded by rail is narrower and the ocean rates obtainable at these ports are higher than from New York.

While shipments from the port of Montreal make it the leading grain port of North America, a large part of the grain shipped through this port comes from the United States. On the other hand a large proportion of the Canadian grain crop is exported to Europe through Buffalo and New York or other North Atlantic United States ports.

Canadian railroad and steamship companies have received much criticism from the public for allowing Canadian grain to be shipped to a large extent via the United States. Unfortunately a transportation company cannot dictate to its customers where their goods are to be shipped. The railway and the steamships exist only to carry commodities where their owner wishes them to be sent. The Canadian National Railway has a grain route in the Transcontinental from Winnipeg to Quebec; but grain shippers prefer to send their wheat to Fort William and Port Arthur.

Grain is very sensitive to freight rates and will always flow along the cheapest route to Europe. The rates which determine its route are not merely Atlantic freight and insurance rates, but include the total of rates from the Western terminals on the Great Lakes to the ports of entry on the other side of the Atlantic. A net difference of 6 cents per ton in favour of one route over another will attract the traffic. [1]

The port of New York possesses certain advantages over the port of Montreal. Vessels come to New York from all parts of Europe and there are frequent sailings to these points all the year round. There are regular lines of steamers between New York and European ports with which at Montreal there is no regular connection. This large amount of ocean tonnage is available for the carriage of grain out of New York. Regular liners make practically no profit in carrying grain. Their profit lies in the carrying of package freight and grain is looked upon as merely ballast. [2] There is at New York a greater amount of package freight available than at Montreal. A variety of opportunity thus exists at New York for securing low rates on grain shipments.

Tramp steamers waiting for charters lie off Norfolk

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[1] Report of the Royal Grain Inquiry Commission.
[2] Kindness of W. H. D. Miller.

where they are within convenient call of any of the North Atlantic United States ports. These are of course available for grain transportation and help to make the rates from New York favourable to the shipper.

Montreal, on the other hand, has other advantages which New York lacks.[1] Montreal is on the direct line to Europe from the Western States, and while navigation is open on the Great Lakes the St. Lawence has the advantage of a cheaper and more direct mode of transportation. The facilities for handling grain at the port of Montreal are superior to those at the port of New York. At New York the grain has to be loaded into lighters and towed to the vessel's side and there elevated into the vessel by a floating elevator. At Montreal, the grain can be discharged into the transfer houses and transported from there directly into the holds of the vessel.

The United States crop is harvested several weeks earlier than the Canadian crop. The advantages of the St. Lawrence route attracts heavy shipments from the United States ports on the upper Lakes to Montreal. A large part of the United States crop is exported before the Canadian wheat begins to be transported. On account of the lateness of the Canadian harvest, navigation on the St. Lawrence closes before the crop can be transshipped to Europe through Montreal. The St. Lawrence is closed to navigation usually about two weeks earlier than the Great Lakes. For the latter part of the shipping season, Canadian grain, since it cannot come down the St. Lawrence, is deflected towards Buffalo or Georgian Bay ports whence it is carried by rail to some ocean port.

The total amount of United States grain which was received at Georgian Bay ports during the crop year of 1922-1923 amounted to 38,818,915 bushels. From these ports, the grain was forwarded by rail, the largest quantity, 24,194,380 bushels, being sent to Montreal. Port Colborne received 16,165,830 bushels of United States grain, all by vessel. The shipments, 16,191,921 bushels, were all destined to Montreal.[2]

According to the returns from the elevators at Montreal, the amount of United States grain received was 25,128,467 bushels by vessel and 29,254,252 bushels by rail, which, with the carryover from the previous year, amounted to a total of 58,154,703 bushels.[3]

Shipments of United States grain from Canadian ports shows a decrease over 1921-1922 as shown in the following table:

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[1] Report of the Royal Grain Inquiry Commission.
[2] Report of the Canadian Grain Trade, 1923.
[3] Ibid.

Overseas Movement of United States Grain Through Canadian Ports [1]

	1921-22 bushels	1922-23 bushels
Montreal	81,507,095	52,378,774
Quebec	3,243,782	351,581
St. John	4,822,353	2,582,880
Total	89,573,229	55,313,235

The ocean freight rate varies according to the season. In May, 1924, the rate on grain shipments to Liverpool from New York, Boston, Philadelphia and Baltimore was 2s. 6d. per quarter of wheat: this is equal to 12½ cents per 100 lbs. The rates on ocean shipments from Montreal are regulated by the rates which the steamship companies are asking to carry grain out of Philadelphia, New York and Boston. In May 1924, the rates on shipments of wheat from Montreal were:

To Manchester	3s. 6d.	per quarter:	17½ cents per 100 lbs.
To Hull	4s.	per quarter:	20 cents per 100 lbs.
To London	3s.	per quarter:	15 cents per 100 lbs.
To Liverpool	3s. 3d.	per quarter:	16¼ cents per 100 lbs.

While the Canadian wheat harvest is completed within a month, Canadian wheat is shipped to England all through the year. It is essential that the flow of wheat from North America to Europe should be constant as in Europe large storage elevators are not used in the grain trade. Sheds and flat warehouses are provided on the quays, but the grain passes quickly through these to the millers. Every mill has silos (elevators) and bins for storage, but these are all privately owned, so that an estimate of even their approximate capacity is impossible. Publicly owned silos and flat warehouses have been erected at the most important ocean ports in Britain.

Approximate Capacity of Public Storage in Britain: [2]

	bushels
London	4,750,000
Liverpool, Mersey Docks & Harbour Board	2,220,000
" Transit & Storage Co.	8,000,000
Hull	1,500,000
Manchester	3,000,000
Bristol	4,800,000
Glasgow	1,250,000
Dublin	500,000

[1] Report of the Canadian Grain Trade, 1923.
[2] Report to the Royal Grain Inquiry Commission.

While the silos are all of the most modern construction with the best facilities for intake, weighing, cleaning, drying, etc., such a small quantity of grain is stored in them that the problem is to obtain sufficient grain to defray the interest charges. The storage charges and the handling in and out of the elevator are very high. Importers of wheat always try to sell before the arrival of their shipment in order to escape interest and elevator charges and to avoid the risk of fluctuations in the price or in the rate of exchange. [1]

In Rotterdam, the receiving port for Holland and Western Germany, the same conditions prevail. [2] The three grain silos for storage purposes are nearly always empty. Only those importers who are caught with unsold corn use the storage.

Owing to the enormous quantities which must be shipped from Canada, and the limited number of vessels on the Lakes to carry it, a certain amount of grain is caught by winter every year and must be held over in elevators or vessels until navigation opens again in the following spring. Some grain is also held in storage by the farmers in the hope of a rise in price.

Stocks of Wheat in Canada, March 31st., 1918, 1919, 1920, 1921 and 1922 [3]

Wheat in —	March 31st				
	1918	1919	1920	1921	1922
Elevators	20,525,213	69,983,064	30,622,398	35,802,263	58,338,581
Flour Mills	4,802,236	5,390,066	5,575,253	3,635,818	4,000,000
Transit by rail	20,021,179	10,854,840	6,271,697	7,119,983	10,998,505
Farmers' hands	31,684,700	37,315,000	34,837,000	48,919,000	41,649,000
Total	77,023,328	118,542,970	77,306,348	95,477,163	114,986,086

The new crop comes to the market before the crop of the previous year is entirely exported. In 1918 the total Canadian wheat crop was 189,075,000 bushels. At the end of that crop year (August 31st., 1919), 2,149,000 bushels or 1.14 per cent of the crop was still in the hands of the farmers. The wheat production of the summer of 1919 was 193,260,000 bushels, of which 1.10 per cent or 2,122,000 bushels was still in the farmers' hands on August 31st., 1920. In the next crop year, 1920-1921, the farmers held 0.81 per cent of the wheat crop on August 31st., 1921, only 2,144,000 bushels out of a total of 263,189,000 bushels.

[1] Report of the Royal Grain Inquiry Commission.
[2] Ibid.
[3] Canada Year Book, 1921.

Besides the wheat which the farmers hold over from one season to the next, a certain amount is to be found in elevators, vessels, freight cars, etc. The following table shows the stocks of wheat in Canada at the close of the crop years 1919, 1920 and 1921:

Stocks of Wheat in Canada at the close of the Crop Years 1919, 1920 and 1921 [1]

Quantities in —	Aug. 31st 1919 Bushels	Aug. 31st 1920 Bushels	Aug. 31st 1921 Bushels
Farmers' hands	2,149,000	2,122,300	2,144,400
Country Elevators in West	762,362	980,000	1,566,689
Terminal Elevators	433,920	1,603,811	2,367,181
Public Elevators	2,108,884	4,316,527	874,045
Eastern Elevators	.....	30,007	23,260
Flour Mills	.....	237,780	719,624
Transit by Rail	.....	.....	6,031,889
Total	5,454,166	9,290,425	13,727,088

[1] Canada Year Book, 1921.

CHAPTER VI

THE PORT OF MONTREAL

Montreal's unique situation gives this port great natural advantages as a point of interchange between inland and ocean traffic. Sixteen hundred miles of inland water traffic terminates at the foot of the Lachine Rapids in the Harbour of Montreal.

Ocean navigation on the St. Lawrence begins at Montreal, 857 nautical miles from the Atlantic by way of Belle Isle, or 967 miles via Cape Race. The distance from Liverpool to Montreal is slightly less than to other Atlantic ports on the United States coast.

	Distance to Liverpool	Montreal's Advantage
Montreal (nautical miles)	2,972	—
New York "	3,056	84
Philadelphia "	3,199	227
Baltimore "	3,355	383

From Montreal steamers run direct to most of the important ports of the world. This port is also Canada's great railway centre, for trunk lines stretch out in every direction from this point, while three transcontinental lines reach ocean navigation at its harbour.

The climate is the worst enemy of the port of Montreal, the navigation season opening about April 20th. and closing about December 1st. But despite this handicap, Montreal in 1921 and 1922 shipped more grain in seven months than New York shipped in a full year.[1] During the season, weather conditions on the River St. Lawrence are very good, fogs being rare in the contracted part of the river extending from Murray Bay to Montreal. The channel is well buoyed and lighted.

The first step toward the improvement of the Port of Montreal for ocean vessels was taken in 1824 when a commission was appointed to report on the state of the Harbour.[2] The result was the passing in 1830[3] of the Statute entitled "An Act for the Improvement of the Harbour of Montreal."

[1] Figures issued by M. P. Fennel, Jr.
[2] Chronology of Montreal.
[3] 10-11 Geo. IV., c. 28.

The work was entrusted to three Commissioners appointed under this statute.

The Commission was apparently appointed for that special work alone, but was continued by Acts passed from time to time [1] as the scope of the work widened. The Commissioners were appointed during the pleasure of the Crown and till 1855 there were only three: the number was then increased to five, and in 1873 to nine. At present there are again three commissioners appointed by the Crown.

The river with its lights, buoys, pilots, etc., formerly under the Trinity House of Quebec, [2] was by ordinance [3] of the Special Council (1839-40) placed under the care of a newly constituted Trinity House of Montreal, in whose charge it remained until 1873 when the Trinity House of Montreal was dissolved [4] and its duties assigned to the Harbour Commissioners.

The water of the St. Lawrence is very clear. Below Montreal, where the river widens into Lake St. Peter, such slight sediment, as the river carries, is deposited. The depth here was only ten feet in 1850, when dredging was begun. By 1888 the depth was increased to 27½ feet at ordinary low water. The debt incurred by the Harbour Commissioners of Montreal in the dredging of this channel — about 50 miles long — was taken over (1888) by the Dominion Government who recognized the importance of the St. Lawrence as a National route: at the same time the waterway was opened free to the shipping of the world. In 1899 the Canadian Government undertook to deepen the ship channel and in 1907, a 30 foot depth was completed between Quebec and Montreal. [5]

In 1909 the Board of Harbour Commissioners prepared an elaborate and extensive plan of development which with its component facilities was intended to make provision for the ensuing 25 years. [6] As item after item was completed, the commerce which had been beginning to flow through the port in 1909 increased steadily year by year. In 1921, Montreal was called upon to handle a volume of commerce very much in excess of that prevailing in any previous year. Because of the fact that the scheme of development had been completed within eleven instead of twenty-five years, as originally planned, the facilities of the port were just sufficient to meet the demands made on them.

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[1] 1 Wm. IV., c. 11; 2 Wm. IV., c. 36; 1 Vic., c. 23, etc., etc.
[2] 45 Geo. III., c. 12.
[3] 2 Vic., c. 19.
[4] 36 Vic., c. 61.
[5] Port of Montreal: Stephens & Cowie.
[6] Report of the Montreal Harbour Commissioners, 1922.

The total cost of the port of Montreal has been thirty-nine and a half million dollars, and this is represented at the end of the year 1923 by:[1]

Deep draft berths capable of accommodating over 100 modern large ocean steamships simultaneously.

Thirty-five of the steamship berths are at modern concrete wharves, built in the last few years.

Three large modern fire-proof elevators, with conveyor system to twenty-six steamship berths, at which nineteen vessels can be loaded with grain at one time.

Twenty-four permanent fireproof transit sheds.

Modern cold storage warehouse.

Sixty miles of Harbour Railway tracks.

Complete and valuable construction and repair plants.

About two hundred acres of land, all reclaimed, situated in the most valuable position, industrially, in Montreal.

The extent of the wharves and piers at the end of the season is as follows:

30 ft. depth and over at O.L.W.	28,503 lin. ft.	or 5.3083 miles
25 to 30 ft. depth	15,312 lin. ft.	or 2.9000 miles
Total deep draught	43,815 lin. ft.	or 8.2983 miles
20 ft. depth and under	1,398 lin. ft.	or 0.2647 miles
Total wharfage, 1923	45,213 lin. ft.	or 8.5630 miles

The capacity of the grain elevators at Montreal at the opening of navigation in 1924 was as follows:

Elevator No. 1	4,000,000 bushels
Elevator No. 2	2,662,000 bushels
Elevator B	3,500,000 bushels
Elevator No. 3	2,000,000 bushels

The new elevator which is being constructed at Tarte Pier will have an ultimate capacity of 10,000,000 bushels.

The following table shows the grain exports of Montreal during the year 1921 as compared with other large grain exporting ports of North America:[1]

Grain Exports, 1921

	Bushels
Montreal	138,453,980
Galveston	94,173,049
New York	84,698,581
New Orleans	55,314,808
Philadelphia	46,769,286
Portland, Me.	13,859,040
St. John, N.B.	10,638,339
Boston	5,078,617
Newport News	485,118

[1] Report of the Montreal Harbour Commissioners, 1923.

The unusually large amount shipped from Montreal in this season was attributed to the discount on Canadian funds which then existed, and which attracted United States exporters to the St. Lawrence Route. Predictions were made at the time that this record was "only a flash in the pan," etc.

However, in the following year, 1922, Montreal exceeded the previous year's record by exporting 17,000,000 bushels more, or a total of 155,033,817 bushels.

In that year, 1922, Montreal still led all other North American ports. [1]

Grain Exports, 1922

	Bushels
Montreal	155,033,817
New York	127,488,000
Baltimore	88,521,000
New Orleans	62,994,000
Philadelphia	60,237,000
Portland, Me.	19,444,000
Galveston, Tex.	17,646,000
St. John, N.B.	15,373,048
Vancouver	14,397,590
Boston	13,398,000

The grain traffic through Montreal in that season was to some extent due to the Pennsylvania coal strike, which tied up the United States railways. The rate of exchange also worked in favour of the Canadian port.

In 1923, however, no coal strike existed while the difference between Canadian and American exchange was very slight, showing that exports from Montreal are not due to either of these causes but to the efficiency of the port. The exports from January 1st. to November 1st. are as follows: [1]

Exports of Grain from United States and Canadian ports to November, 1923

	Bushels
Montreal	104,375,023
New York	77,769,000
Baltimore	39,233,000
Philadelphia	29,465,000
New Orleans	18,977,000
Galveston, Tex.	10,349,000
Boston	5,915,000
Norfolk	3,433,000
Port Arthur, Tex.	1,409,000
Newport News	144,000

[1] Information kindly supplied by Montreal Harbour Commissioners.

Figures for the complete season of 1923 place Montreal's total grain exports at 120,107,999 bushels.

These figures show a considerable decrease for exports from Montreal. Mr. Fennel, then General Manager of the port of Montreal, explained this by the fact that the exports from the whole American Continent were less during that year, due to a smaller demand in Europe and to competition from other grain producing countries, especially Russia and India. Mr. Fennel said, "We have every reason to be satisfied with our share of the grain exported from the North American Continent."[1]

Not all the grain exported from Montreal is grown in Canada. A certain amount of American grain is shipped from Duluth down the Lakes by either all water or lake and rail routes, and exported from Montreal.

Grain Handled Through the Port of Montreal

	1921 Bushels	1922 Bushels	1923 Bushels
American Grain	75,559,664	76,858,946	33,704,531
Canadian Grain	62,894,316	78,063,737	86,403,459
	138,453,980	154,922,683	120,107,990

Figures for grain shipments from the port of Montreal include the exports of wheat, oats, peas, barley, rye and buckwheat. The shipments of wheat are greater than the shipments of any other one grain.

Quantities of flour and wheat received at or shipped from Montreal during a period of forty years[2] are given as follows:

	Flour		Wheat	
	Receipts Barrels	Shipments Barrels	Receipts Bushels	Shipments Bushels
1883	1,012,706	776,242	608,911	5,008,167
1893	809,591	984,395	8,257,087	7,099,151
1903	1,313,497	2,174,607	19,546,739	16,055,004
1913	1,094,426	1,386,583	41,105,231	33,715,007
1914	2,491,655	2,190,889	70,119,614	61,552,123
1915	1,442,688	1,655,526	44,450,263	34,202,957
1916	3,795,999	4,098,160	58,382,190	34,719,348
1917	1,413,486	4,976,611	33,662,466	35,702,080
1918	4,546,016	6,045,393	36,359,093	24,041,526
1919	5,564,559	6,172,138	43,834,199	33,915,158

[1] Montreal Gazette, November 15th., 1923.

[2] Figures kindly supplied by the Montreal Harbour Commissioners.

1920	1,754,624	2,326,713	45,554,675	44,120,713
1921	2,319,089	2,745,324	61,040,506	50,111,641
1922	3,223,179	4,365,783	91,621,859	83,675,805
1923	3,144,181	4,606,451	99,811,766	88,599,660

Grain Handled by the Port of Montreal [1]

	1921 Bushels	1922 Bushels	1923 Bushels
Received by water	61,333,529	86,062,273	74,631,578
Received by rail	77,120,451	68,860,410	45,476,412
	138,452,980	154,922,683	120,107,990

An organization which adds greatly to the efficiency of the port of Montreal is the Grain Clearance Board. [2] During September, 1921, the harbour facilities for the handling of bulk grain for export were being hard pressed to keep up with the traffic; enormous quantities were constantly arriving by rail and water from the West to be transshipped to ocean steamers.

A meeting to consider how the traffic could be better handled was called at Ottawa by the Minister of Marine and Fisheries, and the Minister of Railways and Canals, which was attended by representatives of the Montreal Harbour Commission, railroad and shipping interests, and grain exporters. It was decided to form a Committee of Four to take over direct control of the whole situation. The Committee began work immediately and built up the efficient machine now known as the Grain Clearance Board. Its effects were felt within a few weeks of its origin, when the whole movement of grain through Montreal went forward at a swifter pace than ever before.

In 1922 it soon became apparent that Montreal would be called upon to handle at least as great an amount of grain commerce as in the preceding year, and accordingly on April 4th, the Grain Clearance Board was again appointed.

The Board has for its main object the accumulation and dispensation of accurate and up-to-date information in connection with the export grain movement through the port of Montreal. Information under the following headings is kept written up daily and posted at the office of the Board so as to be available at a glance:

[1] Figures kindly supplied by the Montreal Board of Harbour Commissioners.

[2] Report of the Montreal Harbour Commissioners, 1922.

1. Stocks of grain in the Montreal Elevators, showing grades, etc.
2. Records of Lake vessels en route from Port Colborne to Montreal.
3. List of the large vessels waiting at Port Colborne to be unloaded.
4. List of vessels en route from Fort William to Bay ports and Montreal.
5. Shipments by rail from the Grand Trunk Railway Bay ports, Depot Harbour, Tiffin, Goderich, to Montreal.
6. Similar information in regard to the Canadian Pacific Railway Bay ports, Port McNicoll and Goderich.
7. List of Tramp steamers chartered to load at Montreal.
8. Tramp steamers coming up the St. Lawrence.
9. Record of each day's receipts and deliveries of grain by the Harbour Commissioners Elevators and Grand Trunk Elevator B.
10. Record of total quantity of grain handled to date including receipts and shipments for the whole port.
11. List of Tramp steamers in the order in which they are to receive grain: i.e. the order in which certificates are issued by the Port Warden of each steamer's readiness to take grain.

With so much knowledge of the whole grain situation at its command, the Grain Clearance Board is in a position to formulate ideas of policy and to recommend to the Harbour Commission new rules to add to the general efficiency of the port of Montreal. For example, they recommended the increase of rates on grain in storage at Montreal elevators after September 20th, so that the accommodation might be available for transfer grain during the busy autumn season: the Harbour Commissioners acted on their advice. Again, in May 1922, complaints were received that certain vessels in port refused to take grain after 6 p.m., although their grain was in the elevator waiting to be delivered to them, and their refusal seriously delayed the operation of the elevators: the reason given by the ships for this stand was that they would not pay the elevator over-time charge. The Harbour Commissioners, on the advice of the Grain Clearance Board, passed a resolution "That vessels taking grain must continue to do so until eleven o'clock at night, and in case any vessel refused to conform to this rule, the Harbour Master is authorized to remove such vessel from the berth occupied by her."[1]

[1] Report of the Montreal Harbour Commissioners, 1922.

It will be seen from the above examples that the work of the Grain Clearance Board is in close co-operation with the Harbour Commissioners. The information and influence of the Board have also been used by grain brokers, ocean and lake shipping men and the railroads.

Canada has a relatively small population whose consuming power is in inverse ratio to its producing power, so that a great disparity exists between the volume of traffic into and the volume of traffic out of the country. The cost of transportation from the interior of Canada to the markets abroad can be lowered through the development of inbound cargo traffic. One of the proposals to effect this, by attracting more inbound cargoes to the St. Lawrence route, is the creation of a Free Zone at Montreal. At the Convention of the American Association of Port Authorities at Toronto, in September, 1922, the President of the Montreal Harbour Commission, Dr. McDougald, spoke of the suggested Free Zone as follows: [1]

"In proportion to the development of this movement (viz., of cargoes inward) will be our ability to reduce carrying charges to our producers. A constant increase of cargoes inland, by the St. Lawrence, over and above the demands of our own import trade, is urgently needed in order to stabilize chartering and rates, and so induce a constant movement of full cargo freighters throughout the whole period of navigation. What is believed would develop and greatly promote such a movement would be the creation of a free zone or district, in the Harbour of Montreal, to which goods, wares and merchandise from overseas might be consigned in bulk to be warehoused and broken up or fabricated, in whole or in part, either with or without Canadian raw material: or otherwise made ready for reconsignment or transshipment to their ultimate market, whether here in Canada or in the United States. Under such a system, Canadian Customs duties would be imposed only upon merchandise entered for Canadian consumption."

Copenhagen is the best example of a free port operating under modern conditions. This city is situated on the narrow waterway which commands the entrance to the Baltic Sea. The free port was created in 1894 when the creation of the Kiel Canal threatened to divert all Baltic trade. Since then, the port of Copenhagen has been entirely reconstructed on the most modern lines and has developed into a great clearing house and re-export centre. [1]

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[1] Report of the Montreal Harbour Commissioners, 1922.

The situation of Montreal as a possible free port is better than that of Copenhagen, as from Montreal distribution can be made either by rail or water routes into a third of the continent. Within twelve hours by rail an aggregate population of not less than 15,000,000 might be served from this point. The distance from any port in Northern Europe to Montreal is less than to any Atlantic port. Montreal would become the hub of the wheel of distribution over North America. [1]

The creation of a Free Zone would increase greatly the trade and commerce of the port, since the expansion in the number of inbound cargoes and the consequent increase in the numbers of freighters reaching the Port would result in more bottoms available for the ever increasing grain exports. Every ship coming to this port would be assured of a return cargo. [1]

[1] Report of the Montreal Harbour Commissioners, 1922.

CHAPTER VII

PROPOSED TRANSPORTATION ROUTES

I. THE GEORGIAN BAY SHIP CANAL

The proposed Georgian Bay Ship Canal would provide a new all-Canadian waterway from Georgian Bay by the French River, Lake Nipissing and the Ottawa River to the St. Lawrence. The Government of United Canada procured an engineer's report on the project in 1858, and again in 1860, but the development of the railways during the years following Confederation lessened the demand for the new canal. With the increased settlement of Western Canada, and the consequent ever enlarging grain crop the scheme was again brought to public notice as a method of solving the transportation problem. In 1904 the Dominion Parliament granted $250,000 for a detailed survey of the proposed waterway. The Board of Engineers in charge of the survey submitted their report in 1908. By the route followed, the distance from French River Village on the Georgian Bay to Montreal Harbour was 440 miles. Their plans called for 28 miles of canal excavation, 66 miles of channel dredging and 346 miles of river and lakes with 27 locks of a minimum length of 650 feet with 65 feet clear width and 22 feet clear depth, the lift ranging from 5 feet to 50 feet; and with a minimum water supply in the summit basin capable of being increased, which would permit of 20 lockages a day throughout a season of 210 days. The time taken by a lake freight boat of 12 mile maximum speed, without delays at locks or in meeting other boats, from French River Harbour to Montreal was estimated at 70 hours.[1] The cost of such a waterway, which it was thought could be built in ten years, was estimated originally at $100,000,000, with an annual maintenance charge of $900,000. On account of the rising cost of materials, the capital outlay was later estimated at $150,000,000.[2]

In 1914, a Royal Commission was issued for a report on the "commercial feasibility and national advantages of such a canal" and consider many of the transportation problems of Canada. Among the questions to be considered were: the competition of the waterway with the railways and the

[1] Report of the Board of Engineers, 1908.
[2] Debates of the House of Commons, May 18th., 1918.

subsequent effect on the railways; the probable volume of traffic on the new waterway; the length of the navigation season; the traffic of the Great Lakes, including rates; the effect on the North-West, etc., etc. [1]

All these questions need a great deal of study before conclusions of any value can be reached. For this reason the Commission issued, from time to time, interim reports on such of the economic considerations as has been studied. The first Interim Report, issued in 1916,[2] covered traffic on the Great Lakes, the routing of wheat, etc. Subsequent Reports, issued in 1918,[3] gave a comparative study of the United States and Canadian markets and transatlantic passenger and freight traffic steamship subsidies. The inquiry was suspended and no further reports have been issued.

The advantage in distance between Lake ports and Liverpool which the proposed Georgian Bay Canal has over the present St. Lawrence Route is shown in the following tables:[4]

Proposed Canadian Route:

(Via Great Lakes, Georgian Bay Ship Canal and Montreal)

	Distance to Montreal	Distance Montreal to Liverpool via Belle Isle	Total Distance
Fort William to Liverpool	934	3,189	4,123
Duluth to Liverpool	1,056	3,189	4,245
Milwaukee to Liverpool	906	3,189	4,095
Chicago to Liverpool	972	3,189	4,161

Present Canadian Route:

(Via Great Lakes, Welland & River St. Lawrence Canals and Montreal

Ft. William to Liverpool	1,216	3,189	4,405
Duluth to Liverpool	1,338	3,189	4,527
Milwaukee to Liverpool	1,176	3,189	4,365
Chicago to Liverpool	1,242	3,189	4,431

Advantages of the Georgian Bay Route:

Fort William to Liverpool	282 miles
Duluth to Liverpool	282 miles
Milwaukee to Liverpool	270 miles
Chicago to Liverpool	270 miles

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1 Canadian Sessional Papers, No. 193, 1916.
2 Canadian Sessional Papers, No. 193, 1916.
3 Canadian Sessional Papers, No. 141, 1918, and No. 142, 1918.
4 Engineers' Report, 1908, p. 318.

The great argument in favour of the Georgian Bay Canal is that no international waters are affected, the route running through Canadian territory from French River Village right down to Montreal, and thence down the St. Lawrence to the ocean. There would, therefore, be no danger of misunderstanding and disagreement with the United States, such as might occur over the St. Lawrence Deep Waterway. For this reason, the Georgian Bay Canal is being advocated today by opponents of the St. Lawrence Deep Waterway.

II. THE HUDSON BAY ROUTE

The Hudson's Bay Company has made use of the Hudson Strait and Hudson Bay as a means of access to the Canadian Northwest and, for 250 years, have used this route in connection with their fur trade.

It is natural, therefore, that the people of the Canadian North-West should look to Hudson Bay as a possible route for their exports to Europe. Proposals for a railway to connect the wheat fields with tide water on the Bay began in the earliest years of the settlement of Manitoba. During the nineties, the demands assumed the form of an agitation among the farmers, who began to think that the Canadian Pacific Railway was robbing them by its freight rates on grain. Fort Churchill, where there is a natural harbour, and Port Nelson, were each suggested as a suitable terminal. Surveys of possible routes were made by the Dominion Government and in 1911 construction was begun.

The Hudson Bay Railway, which connects at The Pas with the Canadian National Railway branch from the Winnipeg and Prince Albert line, was completed for 332 miles north-east from The Pas to its second crossing of the Nelson River at Kettle Rapids, where a bridge has been built.[1] All this part of the road is reported to be in bad condition from lack of care. The rails were removed during the war, and much work would have to be done to make it fit for traffic. Ninety-two miles of additional construction are necessary before the road will be completed.

An announcement that the Canadian National Railway had been authorized to proceed with the work of construction on the Hudson Bay Railway during the summer of 1924 was made by Hon. Geo. P. Graham, Minister of Railways, in the House of Commons, on March 14th., 1924.[2]

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[1] "The Hudson Bay Railways Belt," issued 1923 by the Department of the Interior.

[2] House of Commons debates, March 14th., 1924.

On March 26th.,[1] the Minister of Railways, in replying to questions in the House of Commons, stated that the Government had already spent approximately $14,500,000 on the Hudson Bay Railway and $6,255,000[2] on a terminal at Port Nelson, or a total of $20,750,000. According to the estimates of the Department of Railways and Canals another $5,000,000 will be necessary to carry the steel to tidewater and a further $20,538,000[2] will be required to be spent on the artificial harbours and elevators at Port Nelson before it will be ready to ship grain. This makes a grand total of approximately $25,538,000 (in addition to the $20,750,000 already expended) which must be spent before the Hudson Bay line can be tried out commercially.

The proposed minimum expenditure of $26,788,000 on the Port Nelson terminal will allow that port to accommodate ten 7,000 ton ships and includes the construction of a grain elevator of 4,000,000 bushels capacity.[1] This seems a large sum to pay for such limited facilities. The Harbour of Montreal has only cost $34,000,000 (1922), has up-to-date equipment, and provides space for more than 100 ships.[3]

If the difficulties of navigation on Hudson Bay are too great to allow regular shipments, the Hudson Bay Railway itself would be of little use in the export of grain.

Ships arriving in the early summer have to contend with ice packs carried by wind and currents from Fox Channel[4] into Hudson Straits. In September, snowstorms are encountered while the long hours of darkness in autumn render navigation more dangerous. Serious magnetic disturbances of the compass must also be expected.

With aids to navigation, lighthouses, wireless, special pilots, etc., such as are now available on the St. Lawrence route, the navigation of the Hudson Strait and the Hudson Bay would be, of course, much less hazardous.

The first serious attempt of the Canadian Government to investigate Hudson Bay and to obtain scientific and practical information were made in 1884, 1885 and 1886 under Commander A. R. Gordon. Since then other expeditions have been sent out, and much information on Hudson Bay itself and the country on its shores, particularly around Nelson and Churchill, has been obtained. In 1923, a pamphlet was issued by the Natural Resources Intelligence Branch of the Department of the Interior which contained a synopsis of all the

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[1] House of Commons debates, March 26th., 1924.
[2] Ibid.
[3] Report of the Montreal Harbour Commission, 1922.
[4] "Hudson Bay," Department of the Interior.

important available information compiled from reports of the various exploratory parties, etc.

This report contains a résumé of the opinion of twenty-seven men, mariners, scientists, Government officials, explorers, and traders who have all had personal experience of travel in northern waters. Their opinion as to the probable date of the opening of navigation on Hudson Bay varied from June 15th to August 1st; the closing date varied from September 15th. to November 30th. The length of the probable season varied from 12 to 22 weeks.

The question of the length and season of open navigation on Hudson Bay is one which seriously affects the problem of how much grain the route could carry. The Canadian wheat crop is harvested from August 10th. to September 10th. If the navigation on Hudson Bay were closed in September or October, there would not be much time allowed to carry the grain from the farmer to the harbour. Much of the crop would have to be stored in terminal elevators until the following summer, while the owner stood the depreciation, interest and storage charges.

Captain Anderson, who was in command of expeditions from 1911 to 1914, estimates the open season as extending from July 15th. to November 15th. An elevator of only two million bushels capacity, if filled with "last year's crop," would provide cargoes for ships during the first month of each season. If the new crop first reaches Port Nelson on August 20th., a steady flow of 500,000 bushels per day until November 15th., would result in the port handling two million bushels of the old crop and approximately forty-three million bushels[1] of the new. These figures are, of course, pure estimates and perhaps too high.

The Hudson Bay route does not provide a navigation season coinciding entirely with the movement of the crop, yet neither does the St. Lawrence route, which, nevertheless, ships much grain.

Boats of all sizes and descriptions, from small sailing craft to modern ocean freighters, have been entering and leaving Hudson Bay by the Hudson Strait for 300 years. In 1914, 39 recorded passages were made through the channel without serious accident. Testimony given before the special Committee of the Senate 1919, as to the type of boat most suitable for use on the route, indicated that such ships should be under 5,000 tons with a draft of 17 feet. Captain Bernier, the Arctic explorer and navigator, thought that the size of boat was not important if the design were correct: the

[1] Mr. F. W. Cowie.

vertical sides of the lake freighter are to be avoided, and special reinforcements to withstand the ice are necessary in the bows. A 3,000 ton vessel is considered to carry about 100,000 bushels of wheat.

The insurance rates on vessels on this route will doubtless be high at any rate until sufficient statistics are available to convince the insurance companies that the risks are not abnormal. Government boats operating on this route in 1914 were asked to pay 11 per cent on a voyage as a premium.[1] lighthouses and other aids to navigation would, of course, bring down the rates.

Although nothing can definitely be known as to the effect which the Hudson's Bay Railway, and the consequent opening of the Hudson Bay route, will have on the transportation of Canadian wheat to Liverpool, until actual experience of shipments can be obtained, yet the Hudson's Bay Route has an advantage in miles over the present routes. From Nelson to Liverpool is 2,966 miles;[1] from Churchill to Liverpool is 2,946 miles. Montreal to Liverpool via Belle Isle is shorter, being only 2,767 miles; but the Hudson Bay route has the advantage over the Montreal-Cabot Straits route, which is 3,097 miles.

The estimated advantages in distance between Liverpool and various important points in the wheat growing areas of Canada are given as follows:[2]

Regina	1,050 miles
Calgary	1,150 miles
Saskatoon	1,175 miles
Prince Albert	1,300 miles
Melford	1,300 miles
Edmonton	1,250 miles

In addition to the advantages in distance, the Hudson Bay Route requires only one handling of grain, viz. the transfer from car to ship at Port Nelson, while the rail and water route to Montreal necessitates three handlings, at Port Arthur, Depot Harbour or Midland, and Montreal.

Those who advocate the Hudson Bay Railway point to the possibilities of the country which it will open up as well as its value in transportation of grain. Very little settlement has been made along the line as yet, so that experience in agriculture in those districts is not very great: such results as have been obtained are not promising. Evidence of a

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1 "The Hudson Railway Belt."
2 Ibid.

variety of minerals is found. The forests are thin and scattered, the only lumbering industry being at The Pas. Fisheries so far have not been successful. Mr. L. C. Nesham, who was assistant engineer on the work at Port Nelson and therefore speaks with experience, is of the opinion that the Railway will stand or fall as a grain route, since the surrounding country offers no freight at all. [1]

Whether or not it would pay to run boats specially constructed and reinforced and able to carry a comparatively small cargo of wheat from Hudson Bay ports during a short season, in the face of great navigation difficulties and high insurance rates, is a questionable point. During the long closed season, these boats, if not idle, would be transferred to other routes where they would come into competition with ships of greater carrying capacity.

Return cargoes from Liverpool to Port Nelson would be necessary to any commercial project, and the present population of 2,000,000 people scattered between Winnipeg and the Rockies and already served by the Canadian transcontinental railways does not yet provide a market for European exports.

Modern engineers may find answers to many of the problems of rendering navigable this outlet, but the fact remains that its geographical position, with attendant climatic conditions, will leave a wide margin for disaster.

Unfortunately for the settlement of the problem, it carries with it serious sectional difficulties of a political character. The commercial interests of Eastern Canada have little to gain and perhaps much to lose, if the road is put into successful operation. Hence, they are inclined to decry the whole project. The population in Western Canada, on the other hand, feel that the completion of the road at the general expense of the Dominion, may bring them great gain and cannot bring any loss.

III. THE PROPOSED ST. LAWRENCE DEEP WATERWAY

The St. Lawrence Deep Waterway project proposes to make it possible for ocean ships to sail up the St. Lawrence and the Great Lakes, and to receive their cargoes for Europe at the Head of the Lakes. The improvements necessary to effect this include the enlargement of all the canals between Montreal and the foot of Lake Ontario. From the upper end of Lake Ontario, the new Welland canal at present under construction by Canada, would give access to Lake Erie;

[1] Montreal Star, April 4th., 1924.

whence, via Lake Huron and the Sault Ste. Marie Canal, ocean vessels would reach the Head of the Lakes. Chicago, Duluth, Fort William, Toronto, and all the cities on the lakes, would thus become ocean ports.

The proposed improvements include the development of hydro-electric power along the St. Lawrence.

The question of the St. Lawrence Deep Waterway was referred to the International Joint Commission [1] by agreement of the Governments of Canada and the United States. The Commission appointed engineers to take charge of the survey.

Their report to the Commission estimated [2] the total cost of the improvements on the St. Lawrence between Montreal and Lake Ontario at $252,728,000, which includes the cost of developing 1,464,000 h.p.

Their plans showed 9 locks, 33 miles of canal with a depth of 25 feet capable of being increased to 30 feet at a later date without interference with navigation, and at an estimated cost of $17,986,180. The total annual cost of operation, maintenance and depreciation of all the works was estimated by the engineers at $2,562,000, of which $1,457,000 is for operation, etc., of the power plants. All the figures in the Engineers' Report are based on the assumption that no water will be diverted at Chicago. As it was uncertain that diversion will be permitted, the engineers felt that they could not properly assume any figure for it. They reported that nearly all the potential power in the river amounting to approximately 4,100,000 h.p. could be developed as co-ordinate parts of the schemes for the improvement of navigation. They did not consider the simultaneous development of such a vast quantity of power to be a sound economic procedure, as a market to take this output is not now in existence and could not be expected to spring into being at once.

The International Joint Commission [1] reported unanimously to the United States and Canadian Governments on January 6th., 1922. Their report was an elaborate document but their conclusions may be briefly summarized. [2]

They found that of the various alternative routes from the interior to the seaboard, none offered advantages comparable with those of the natural route of the St. Lawrence. "Without considering the probability of a new traffic created by the opening of a water route to the seaboard, there exists today between the region economically tributary to the Great Lakes and overseas ports, as well as between the same region

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[1] Appointed under the Treaty of January 11th, 1909.
[2] Engineers' Report: Waterway Commission.

and the Atlantic and Pacific seaboards, a volume of inbound and outbound trade that might reasonably be expected to seek this route, sufficient to justify the expense involved in its improvement." The Commission considered that, because of the wider areas and population served "the benefits derived will at first accrue in much larger measure to American than Canadian interest." They reported that experience had demonstrated not only the tremendous importance of water communication to the foreign commerce of any country, but also the manifest advantages of linking up rail and water routes.

The International Joint Commission recommended[1] that the Governments of the United States and Canada enter into an arrangement by way of treaty for the scheme of improvement of the St. Lawrence River. They advised that such improvements be based upon the report of the engineering board, although further investigations were necessary.

The cost of the canal as estimated by the engineers in their report is $252,000,000. These figures are based, of course, only on the preliminary survey and it is possible that further investigation of the work to be done may raise the estimated cost. After the construction is begun, the costs might conceivably be increased by unforeseen difficulties. The New York State Barge Canal, estimated at $55,000,000, cost in the end over $125,000,000. Indeed it would be a remarkable occurrence if a canal were to be built at its estimated cost.

Canada's share of the original estimate of $252,000,000 would be $126,000,000, to which must be added the capital liability attaching to the present St. Lawrence system, which is approximately $100,000,000; also the cost of the new Welland Canal, now under construction, probably another $100,000,000. Thus the total capital sum would amount to $326,000,000. The interest on this would be no less than $16,000,000, which with the cost of maintenance as estimated by the engineers at $2,500,000, would result in a total of $18,500,000 annually.

Much public interest is evident both in Canada and the United States over the proposed St. Lawrence Waterway. Many Canadian and American organizations have reported themselves to be in favour of the scheme. Others, not so numerous, but very influential, have put themselves on record against it. Those in favour, in general, are the cities and power companies, etc., of the Upper Lakes, the Ontario Hydro

[1] Canadian Sessional Papers No. 39a, 1922.

Electric, the Boards of Trade and the Chambers of Commerce of Toronto, Fort William, Hamilton, etc.,[1] and of American cities on the Great Lakes. The opposition comes from the Montreal Harbour Commissioners and the Quebec Harbour Commissioners, who feel that their prestige as Atlantic ports is threatened. Shipping interests of New York State and other Atlantic ports, the Boards of Trade and Chambers of Commerce of Eastern and Atlantic cities are also in opposition.

A channel of 25 feet deep at low water in the St. Lawrence between Montreal and Lake Ontario would allow most of the vessels engaged in trans-Atlantic trade with United States and Canadian ports, and practically all the ships engaged in coast-wise trade, to sail right up the St. Lawrence and the Great Lakes to Duluth and Fort William. If a ship could load a grain cargo for Liverpool at the Head of the Lakes, the cost and delay of transshipment would be obviated. The question is, whether it would be economical to run an expensive, high-powered ocean ship on inland water. Toronto and other lake ports, ambitious to become sea-ports, expect that all transatlantic ships will immediately desert Montreal for harbours further inland. Montreal shipping men and engineers doubt this.

Sea-going ships must earn on their large initial cost; long drawn out voyages in restricted waters would result in financial loss. It is therefore obvious that the more lightly built and cheaper lake craft, though useless at sea, can carry the grain more economically on the Lakes. The ice and fog, and the consequent high insurance rates on the slow inland voyage, with all its delays at locks, etc., would also be a deterrent to ocean shipping on the Great Lakes.

Mr. F. W. Cowie, formerly engineer at the Montreal Harbour Commission, recognizing the financial difficulties, draws attention to another hindrance to through voyages. Lake ships are constructed with very large rudders, which makes it possible to steer them easily into narrow canals, but at sea, the rougher waves would knock off such rudders. Ocean ships, besides being of heavier construction and having more powerful engines, are equipped with small rudders, which can stand the waves, but on this account, when entering a harbour, tugs have to be used to steer them. This process, if they attempted to enter a lock, would be cumbersome and expensive. Mr. Cowie, who favours the improvement of the St. Lawrence route, expects that the grain will be brought

[1] Canadian Annual Review, 1922.

in 10,000 ton lake-type vessels from the Head of the Lakes to Montreal and there transshipped to Atlantic ships.

Opponents of the St. Lawrence Deep Waterway also claim that as there is at present small demand in the West for goods imported from Europe, vessels proceeding to Lake ports for a cargo of grain would have little freight on the voyage westward. The answer to this is, of course, that as the population of the West increases, inland cargoes will also grow and the St. Lawrence route become less and less a one-way traffic route.

The St. Lawrence Deep Waterway would provide a transportation route primarily for wheat: other commodities will be merely incidental. In the transportation of wheat, as it is today, speed is an essential factor, the aim being to get as much as possible of the crop out of the West before navigation on the Lakes closes. The owners of the wheat have engaged to deliver it abroad at a certain date and are willing to pay a slightly higher rate to get it off their hands quickly and on its way to the foreign market. To obviate possible delays on the St. Lawrence canals the route preferred is that by water to Buffalo, and thence by rail to some Atlantic port.

Under present conditions, traffic on the Lachine Canal is held up by accident for days or weeks every season. Vessels get out of control and break down the guard gates of a lock gate. If these canals were enlarged, the grain could be carried down to Montreal in larger cargoes — 30,000 tons at a time instead of 3,000 tons. But the larger the vessel which can be used on a canal route, the greater will be the risk of accident and damage. Navigators report that with a strong cross-wind blowing a vessel cannot enter a lock, as the lateral pressure of the wind is greater than the propelling power which the Captain dares to use in restricted water. The ship must therefore wait until the storm subsides.

The international boundary line between the United States and Canada cuts into the River St. Lawrence near Cornwall, about 60 miles above Montreal. Between Montreal and Cornwall the St. Lawrence is wholly in the Dominion of Canada. From Cornwall to Lake Ontario, 122 miles, the route is international in character. By the treaty of Versailles, 1783, the boundary line between the United States and Canada was fixed in the middle of the mainstream of the river, and the river in the international portion was defined as being free and equal to the commerce of each nation. By the Treaty of Washington, 1871, the navigation of the whole of the St. Lawrence to Montreal was agreed to be equal even

in that portion of the river which is wholly within Canada. It will therefore be seen that no undertaking of any improvement in connection with the River St. Lawrence can be carried out without a joint agreement of the two countries. It is also apparent that if one of the two countries objects the other one cannot impose on it the construction of the St. Lawrence Waterway, or the development of the Hydro-Electric Power.

The international character of the proposed waterway is, quite apart from the economical issues involved, causing much discussion in Canada.

It is feared that if Canada entered into this partnership with the United States in this undertaking, that Canadian rights of navigation and electric power would suffer. The United States being so much greater than Canada, in commercial and economic strength, might deprive the weaker partner of its share in the management of the enterprise and ultimately obtain complete control of the project.

Canadians do not want to run the risk of endangering the amicable relations existing between their country and the United States.

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